December 1943

Railway Engineering and Maintenance

Reliance HY-CROME Spring Washers

BEHIND THE BRIDGEHEAD TO BERLIN

Hy-crome Pressure Spring

● The bridgehead at Salerno won by American and British forces had to be planned months in advance. The part played by American Railroads in this invasion was vital. Tanks, planes, guns, fuel and food had to be at their destination on time. There could be no slip-ups on this schedule. HY-PRESSURE, HY-CROME and HY-CROME PRESSURE Springs played their part in keeping track in shape so the American Railroads could come through in time.

Hy-crome Hy-pressure

The use of HY-CROME PRESSURE SPRINGS and HY-PRESSURE HY-CROME SPRING WASHERS keep track bolts tight and under constant tension, with reduced maintenance costs. Keep the bridgehead open and supplies moving forward till we reach Berlin.

Streamliner *"City of San Francisco"*
SOUTHERN PACIFIC COMPANY
San Francisco to Chicago in 39 hours, 45 minutes

EATON MANUFACTURING CO. RELIANCE SPRING WASHER DIVISION, MASSILLON, OHIO
Sales Offices: New York • Cleveland • Detroit • Chicago • St. Louis • San Francisco • Montreal

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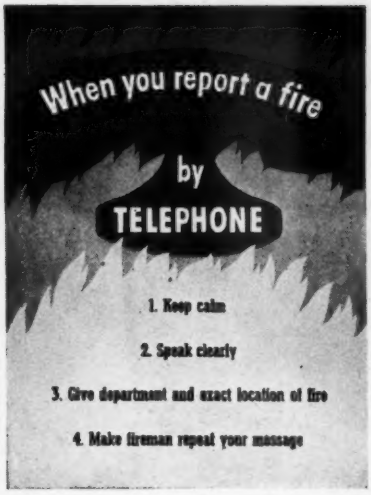
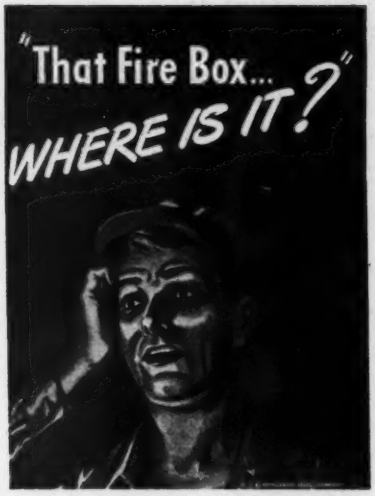
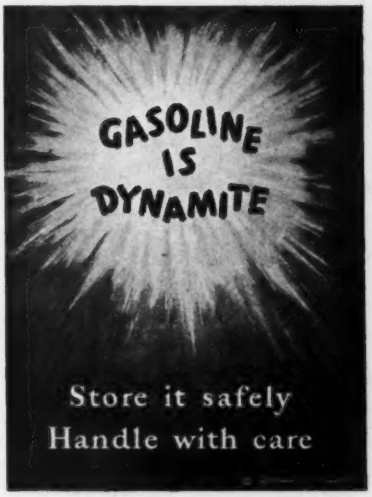




COME ON ED— STOP DAY-DREAMING IN FRONT OF THAT POSTER
HOW TO USE A FIRE EXTINGUISHER
LOOK OUT, ED — SHE'S ON FIRE!
THAT DAY-DREAM KIND OF PAID OFF ... HUH, BILL?

fighting fires with



POSTERS

Bethlehem has long had an efficient fire-fighting organization. But war conditions multiply normal fire hazards. Thousands of new employees have come to work. Large additions have been made to existing facilities, and entire new departments set up. At the same time, war needs have intensified the pressure for production.

Since the start of the war emergency Bethlehem has redoubled its effort to keep down production loss due to fires. Much new equipment has been provided: extinguishers, alarm boxes, sprinkler systems, hose outlets and fire engines. And as plants grew, fire-fighting personnel was expanded, and given special training.

BETHLEHEM STEEL

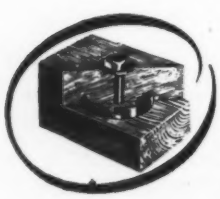
A poster campaign, of which a few representative samples are shown on this page, is one important detail of this program. Each poster registers in the employee's mind a single, specific point in fire-fighting or fire-prevention. Prominently displayed in steel plants, shipyards, fabricating shops, these posters are helping to maintain a favorable fire-loss record through the war years.

A fire on the production front can cost American lives on the battle-fronts. Even seemingly trivial fires have a grave cumulative effect. The aim is to prevent fires from occurring at all—and, if they do occur, to make them die young.

Structural Engineers and Architects — by the Thousands — are using these TECO SERVICES

Many leading companies and government agencies use Teco services. Upon request, Teco engineers have consulted with the engineers of the Army, Navy, and Maritime Commission, The Austin Company, Chas. T. Main, Inc., the Higgins Industries, Inc., and many others on the preparation of timber designs.

You, too, will find the Teco Consulting Service, Design Data Service, Typical Design Service and Research Service of great help in designing and building with timber. Teco distributors and fabricators in all parts of the country * can render helpful services, too. TIMBER ENGINEERING COMPANY—Washington — Chicago — Minneapolis —Portland.



* Firms and addresses supplied on request.

Timber Engineering Company,
1319 18th St., N. W., Washington 6, D. C.

Please send me by return mail a Free copy of *"BUILDING for BATTLE—With the United States Navy."* The story in pictures of the Navy's spectacular use of lumber and timber during the Second World War.

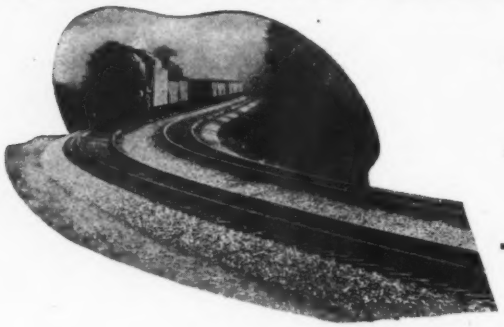
Name.....

Firm Name.....

City.....State.....

RACINE
with
RACINE
HIGH SPEED
PORTABLE RAIL
CUTTING SAWS
Do These Jobs easily, quickly and safely
1 Properly cut and fit rails at interlocking plants, crossings and switches.
2 Effectively close track in rail laying operations.
3 Accurately cut rails for insulated joints.
4 Proper staggering of joints in curves.
5 Removing split or worn and battered rail ends.
6 Cutting out portions of wheel — burned rails and fissures.
Save Manpower, Tool Costs and Time
The experience of one large railroad shows better joints with a 10% lower maintenance cost. 85-lb. rails were cut in 3 to 5 minutes. The cost average was only $2.20 per rail, including all operations necessary to replace rail. Request complete information and prices. Address Dept. RE-S.
Investigate Racine's Line of Metal Cutting Machines, Oil Hydraulic Pumps and Valves
These Production Saws of Modern Industry for fast and accurate cutting of all metals are available in capacities 6" x 6" to 20" x 20".
Racine Oil Hydraulic Pumps for holding, clamping, forming, bending, and feeding operations. Racine Oil Hydraulic Valves in 3/8" to 1 1/2" standard pipe sizes.
STANDARD FOR QUALITY AND PRECISION
RACINE
RACINE TOOL AND MACHINE CO.

To hold the GAGE . . .



—on stiff curves

—at main switches

—near railroad crossings

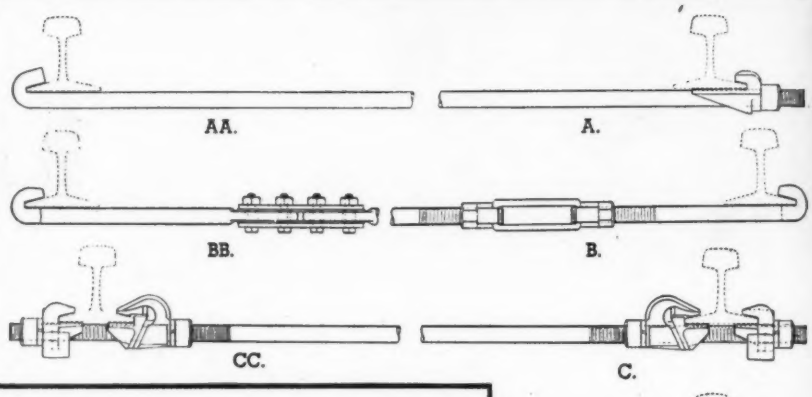
use OLIVER GAGE RODS

Available in various types as indicated by the drawings at the right, Oliver Gage Rods put an end to many of the damaging effects to rails and ties of heavy, high speed traffic. They enable you to maintain accurate gage at switches, curves and turnouts by anchoring both rails together in a single thrust and load-sharing unit. This equalized distribution of loads reduces the crushing effect of lateral thrust on outside rails; ends mechanical destruction of ties caused by loosening of spikes and shifting of tie plates; makes frequent regaging unnecessary; prevents damage to ties through excessive spiking.

Oliver Gage Rods have been developed through years of close association with railroad problems. Made from 1¼" diameter hot rolled open hearth steel, they are furnished with either bent or drop forged rail hooks with adjusting screws, and insulation if desired.

Write for complete data.

OLIVER
IRON AND STEEL
Corporation
PITTSBURGH • PENNSYLVANIA



OLIVER GAGE RODS
TYPES AND RAIL JAWS

AA. Non-Insulated Type
BB. Center Insulated Type.
CC. Double End Type.

A. Rail Jaw No. 10.
For average conditions. Light. Economical.

B. Rail Jaw No. 60.
Turnbuckle. For center adjustment.

C. Rail Jaw No. 50.
Wedge grip with anti-creeper to resist tilt and rail creep.

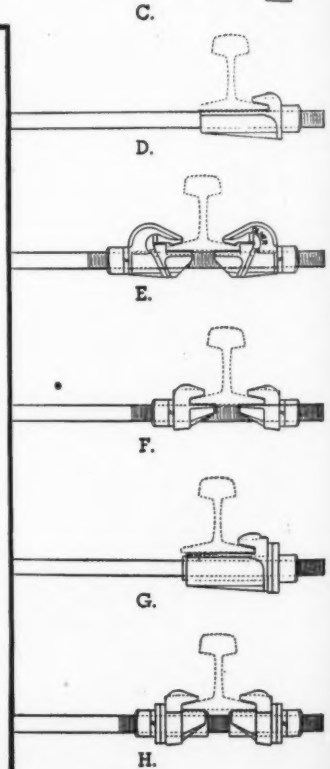
D. Rail Jaw No. 20.
Wide rail-base seat.
For heavier than average service.

E. Rail Jaw No. 30.
Double wedge grip.
Resists rail tilt.
For extreme service conditions.

F. Rail Jaw No. 40.
Vise action resists rail tilt.
Prevents rod slippage along rail base.

G. Rail Jaw No. 70.
End insulated with heavy, water-repellent fibre insulating material.

H. Rail Jaw No. 80.
Combines end insulation with clamp action of Rail Jaw No. 40.
Employs hard fibre insulating sleeves.



Designed for the job
Built for the years!

CHAMPION OF TRACK SHOVELS!

The "Wood" Brand Closed Back Track Shovel meets A. R. E. A. specifications as to blade dimensions, heat treatment and handle requirements. It is a real champion . . . built to stand up and take it . . . hard on the job and easy on the man.

THE STEEL I-BEAM HANDLE REINFORCEMENT

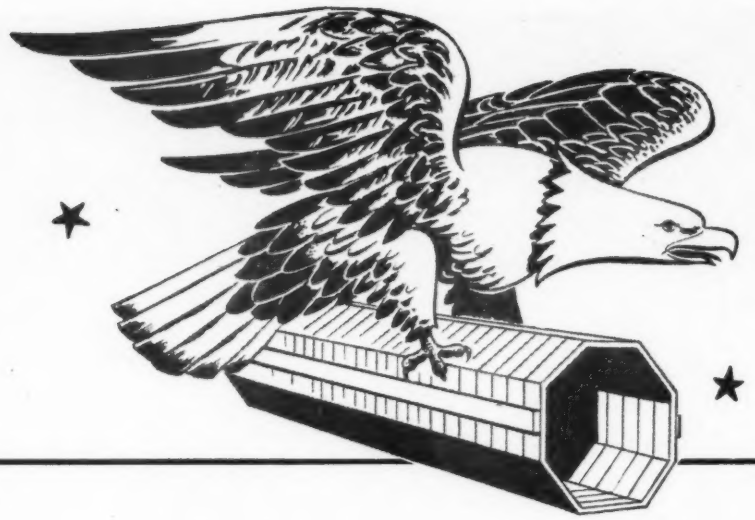
Protects the shovel handle at the point above socket where 65% of breaks occur.

THE WOOD SHOVEL AND TOOL CO.

PIQUA, OHIO

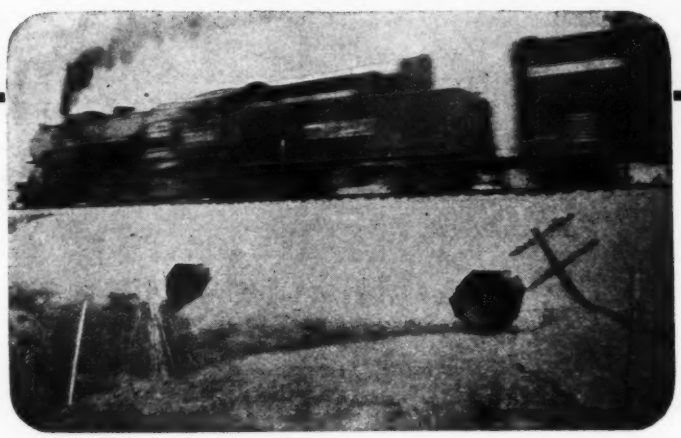
A NATIONAL ORGANIZATION

SPECIALIZING EXCLUSIVELY IN SHOVELS, SPADES AND SCOOPS



THIS STURDY WOOD PIPE

Simplifies Wartime Drainage



Why worry about materials, labor and transportation? Use ARMCO Emergency Wood Pipe and essential wartime drainage will be taken care of economically, efficiently, and *patriotically*.

The special design of this sturdy pipe requires no steel sheets and bands, wire mesh, metal reinforcing or other critical materials. It is amply strong to meet railway requirements. Handling is easy and skilled labor is not required for installation. Equally important, ARMCO Wood Pipe is light in weight and nestable, which often means up to 80 per cent savings in transportation.

Remember, ARMCO Corrugated Metal Pipe is only on temporary "leave of absence." When military needs are satisfied it will be back with its flexible strength, long lengths, tight joints and low installation costs.

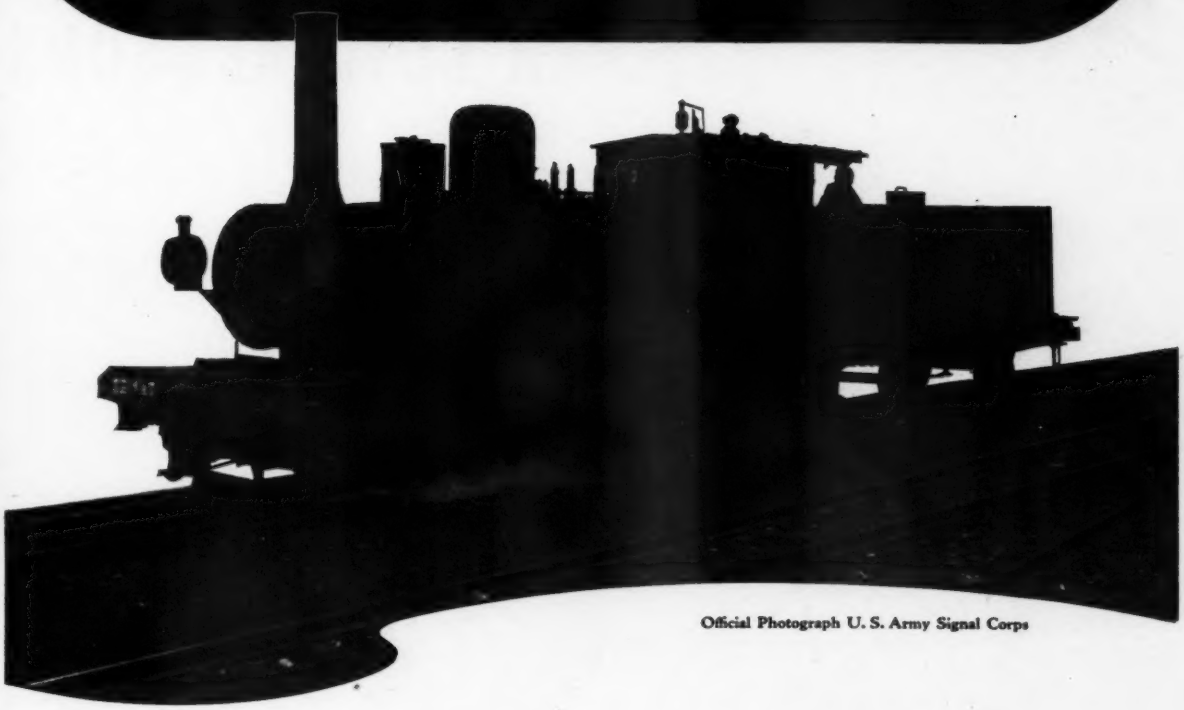
Meanwhile, you can speed Victory by using steel only where engineering integrity demands it. ARMCO Emergency Wood Pipe is a practical substitute and the steel it conserves means more tanks, guns and ships for our fighting forces.

Write for complete data. Armco Railroad Sales Co., Incorporated, 1465 Curtis Street, Middletown, Ohio.

ARMCO ARMCO **EMERGENCY PIPE**

American Tools Keep This Frenchie Operating For Our Boys

★



Official Photograph U. S. Army Signal Corps

● All the war supplies our country is producing (and you are hauling) are useless unless they reach the right places at the right time. Military railroads, such as the French line in the photograph, move war freight those last important miles—to the battle front.

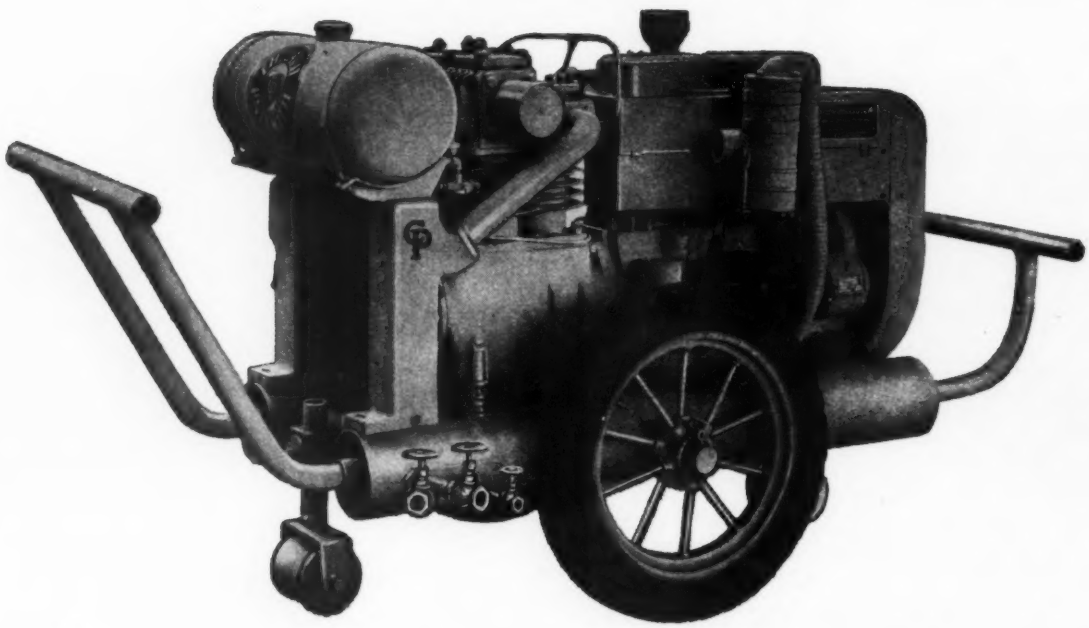
To maintain these foreign roads, America transports railroad battalions of experienced men and equipment. Included in this war cargo are Warren Devil Line Tools. For instance, we recently supplied hundreds of thousands of tools to the Army.

No matter how stiff the demands, most of us agree that the military needs must be fulfilled . . . not only to keep the roads to Victory open but to protect our own boys. At the same time, we realize that the roads at home must have tools, and we have also supplied these. But the combined demands continue to place an ever-increasing burden upon our production.

WARREN TOOL CORP. • WARREN, OHIO

Available for Early Deliveries

CP "PATROL" TAMPER COMPRESSORS



CP "Patrol" Tamper Compressors were designed especially for spot tamping and track or bridge repair work. They are easily transported. Being entirely air cooled, they cannot freeze and are ideal for year-round operation. With an actual capacity of 60 cu. ft. air per minute at 100 lbs., they can operate four CP-3D Tie Tampers or two CP-116 or CP-117 Cut Spike Drivers, or any combination of tools of equal rating. The four-cylinder gasoline engine has 50% more power than the compressor requires — a liberal reserve even for high altitude work. Write for S. P. 2022.

★★★★★★★★★
PNEUMATIC TOOLS
ELECTRIC TOOLS
(Hicycle...Universal)
ROCK DRILLS

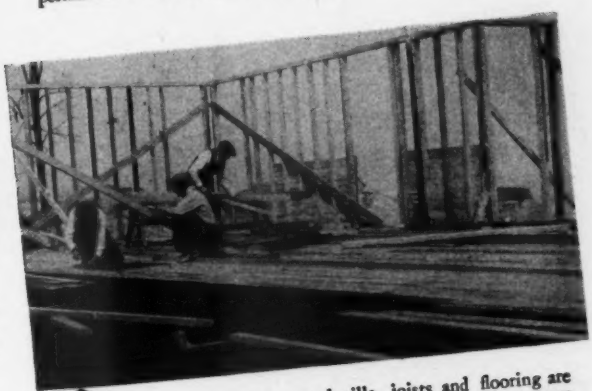
CHICAGO PNEUMATIC
TOOL CP COMPANY
General Offices: 8 East 44th Street, New York 17, N. Y.

★★★★★★★★★
AIR COMPRESSORS
VACUUM PUMPS
DIESEL ENGINES
AVIATION ACCESSORIES

In your building program . . .
plan from the ground up . . . *and down*
on *Pressure Treated Wood*

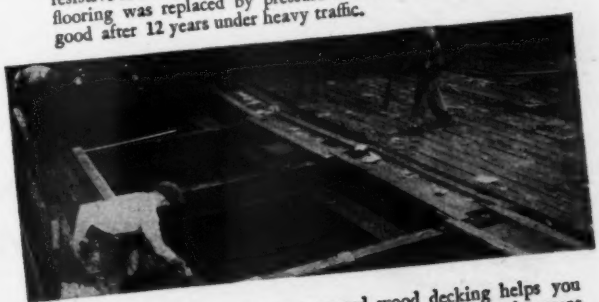
1 LASTING FOUNDATIONS. Pressure-creosoted piling is your quickest, simplest and most economical means of stabilizing foundations in filled or low-bearing ground. Engineers accept it as permanent construction under *all* exposures, in or out of water.

2 LASTING FRAMING. Pressure-treated wood is a great expediter; this building was completed in 90 days. Treatment for fire-resistance as well as decay protection is available. In fires, load carrying capacity of treated wood is reduced at a slower rate than that of steel of originally equal strength.



3 LASTING FLOORS. Pressure-creosoted sills, joists and flooring are dependably protected against termite attack and decay, are more resistive to mechanical wear. In one warehouse, worn-out 4-year-old flooring was replaced by pressure-creosoted wood which is still good after 12 years under heavy traffic.

4 LASTING ROOF TRUSSES. Matching mild steel in strength-per-pound, pressure-treated wood structural members have the additional advantages of availability and speedy, simple erection. Factory pre-framed material can be assembled and installed on the job with local labor.



5 LASTING ROOF DECKS. Pressure-treated wood decking helps you to cut down on the constant maintenance and periodical replacement necessary with short-lived materials. The wood will not spall or corrode, and is dependably protected against decay. Fire-resistant lumber is also available.

A NEW BOOK!
Just off the press . . .
"Economical and Permanent Construction with Pressure-Treated Wood."
Helpful and interesting. Ask for a copy.

KOPPERS COMPANY
WOOD PRESERVING DIVISION
PITTSBURGH 19, PA.

KOPPERS
THE INDUSTRY THAT SERVES ALL INDUSTRY

MAXIMUM STRENGTH
MINIMUM WEIGHT
means
CONSERVATION OF STEEL

BUY WAR BONDS

THE RAIL JOINT COMPANY INC.
50 CHURCH STREET NEW YORK, N. Y.

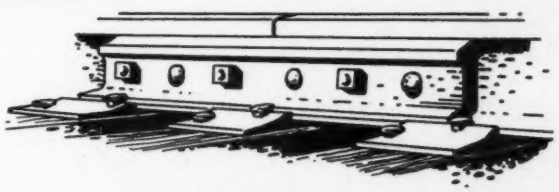
NEVER Give the TREMITES* A "BREAK"!

The slightest unprotected area in the fishing surface of a rail joint is an invitation to the TREMITES, Rusty, Briny, and Dirty, to begin their destructive work. Never give the Tremites a "break". Keep them from getting started by using RMC PLASTIC . . . the tested and time proven metal preserving and lubricating compound that is saving thousands of tons of practically irreplaceable steel rails for the railroads every year.

RMC PLASTIC placed solidly into every section of the joint assembly, thoroughly lubricates and protects the fishing surfaces, shanks and threads of nuts and bolts. When bolts are tightened properly, frozen joints due to corrosion are eliminated and proper rail expansion and contraction are insured, which reduces the danger of kinks and other irregularities in the tracks.

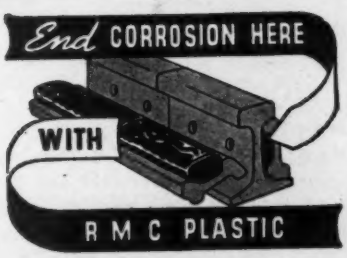
Get a Supply of RMC PLASTIC now —while you can get ALL you need.

**Tremites—Three Mites*



RMC PLASTIC is Easy to Apply

RMC Blocks are placed on the inner faces of the joint bars before assembling. The joint bars are then applied to the rails in the regular manner. As bolts are taken up, the pressure packs the preservative into every section of the joint assembly.



RAILWAY MAINTENANCE CORP.

PITTSBURGH **PENNSYLVANIA**

WHERE MINUTES COUNT . . .

Time . . . always valuable . . . is now priceless! No one knows this better than the men who are charged with the responsibility of maintaining the roadbeds of the nation's railroads, and who have achieved such a splendid record during these critical times in speeding the movement of men, equipment and supplies for the armed forces.

Off-track maintenance methods, in which Allis-Chalmers tractors play an important part, have helped make this record possible. The outfits shown here work free of the tracks at all times — handle any type of maintenance or construction, quickly, safely, without interference to traffic.

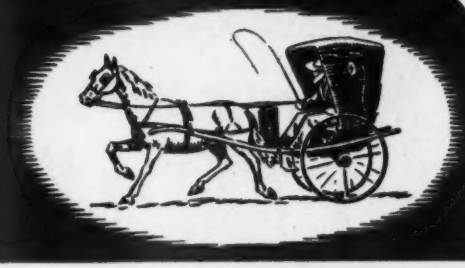
It is now possible to obtain new Allis-Chalmers tractors if you qualify under government regulations. Fifteen per cent of our crawler tractor production is released for essential civilian use. Consult your nearest Allis-Chalmers dealer about the availability of equipment for your needs, or write to us for descriptive literature.

ALLIS-CHALMERS
TRACTOR DIVISION · MILWAUKEE · U. S. A.

Clear weeds from your right-of-way in a hurry, at low cost, with fast-moving Allis-Chalmers tractors and full-view, safety mowers.

Here's an all-'round outfit! This 2-cycle Diesel tractor with 2-wheel scraper and bulldozer licks any grading job. Use the scraper to load, haul and dump material . . . the bulldozer for leveling, rooting trees and stumps, widening, and similar work.

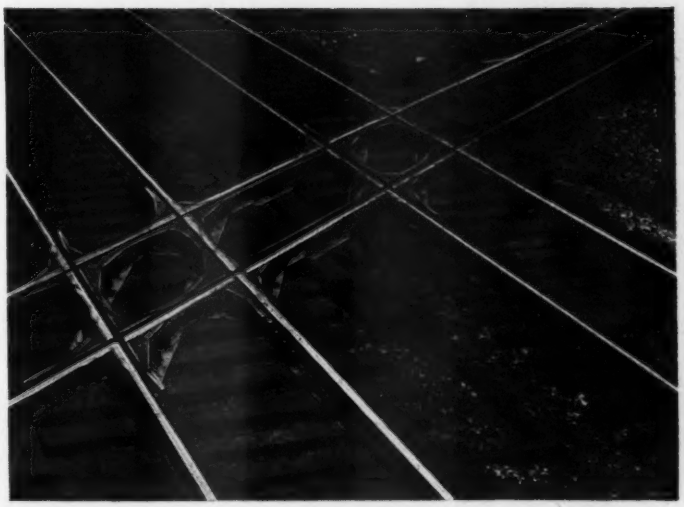
Where your work is mainly clearing big boulders, trees and stumps, building up slopes, or widening ditches—use this fast, powerful 2-cycle Diesel tractor and bulldozer. Operates with ease on difficult jobs.



NOT A ONE HOSS SHAY

The New Racor Manganese Crossing will not last one hundred years and a day; neither will it suddenly collapse after years of service. The new design incorporates:

1. Structural features to prevent flangeway cracks. Note the bearing walls directly under impact points and the heavy bottom plate tying side walls together.
2. Uniform sections to provide the best possible conditions for repairs by welding.
3. Depth Hardening. The Brinell Hardness at intersections is increased to that of work-worn manganese steel. This defers the time when welding will be required.



Many of these Crossings are now in service. May we furnish estimates on yours?

This Crossing will save maintenance through:

1. Long initial wear.
2. Ease of repair by welding.
3. A base structure which will remain sound and allow maximum number of welds.
4. Decreased wear of ties and ballast since impact is decreased by slower wear on crossing points.
5. Less damage to rolling stock because of decreased impact.

3383

RAMAPO AJAX DIVISION
230 PARK AVENUE NEW YORK, N. Y.
ROCHESTER, NEW YORK PUEBLO, COLORADO
NIAGARA FALLS, N. Y. SUPERIOR, WISCONSIN
CHICAGO, ILLINOIS LOS ANGELES, CAL.
EAST ST. LOUIS, ILL. SEATTLE, WASHINGTON
NIAGARA FALLS, ONTARIO

AMERICAN Brake Shoe COMPANY

. . . and drive even harder on the pay-roll savings plan!"

Make War Bonds the Christmas Order of the Day. Urge your workers to make their personal Christmas gifts in the form of War Bonds—and practice what you preach! Make this a 100% War Bond Christmas—to insure future Yuletides of peace and prosperity.

Make up your own posters to spread the "War Bonds for Christmas" story across your plant. Tell the story again and again on bulletin boards, in your plant magazine, and on pay envelope stuffers.

But don't forget your basic, all-important Pay-Roll Savings Plan. How's it going, these days? Perhaps it needs a bit of stoking-up right this very minute, to hold its full head of steam against the competitive demands of the holiday season.

Well, you're the man to stoke it! You can't expect it to keep running indefinitely on last summer's enthusiasm. See to it that your participation percentages, and your deduction percentages, *both* end up the year at new levels.

Every month, now your Pay-Roll Savings ought to run well ahead of the preceding month. *For so many families that formerly depended on the earnings of a single worker, now enjoy the combined earnings of several.* Such *family* incomes are doubled, trebled, even multiplied many times.

Now's the time to turn as much as possible of these increased earnings into War Bonds—War Bonds for Christmas . . . and War Bonds the whole year 'round!

GIVE THE PRESENT WITH A FUTURE—WAR BONDS!

This space contributed to Victory by **RAILWAY ENGINEERING AND MAINTENANCE**

This advertisement prepared under the auspices of the United States Treasury Department and the War Advertising Council

. . . Santa Claus is a *Sissy!*

SANTA CLAUS is only out in the severe cold one night a year, while the men who maintain the railroad right-of-way are out in the frigid weather all winter long.

The confidence placed in the performance of BUDA motor cars, by maintenance-of-way men, all over the world, is the result of years of experience operating BUDA motor cars under all conditions, in all kinds of weather.

Write or wire for bulletin.

BUDA

HARVEY (Chicago Suburb) ILLINOIS

1,000,000
GALLONS MORE PER DAY
through the same 12" Water Main
BY PIPE CLEANING

●

By using Pittsburgh Pipe Cleaning Service, one Steel Plant increased its water flow from 1,500,000 to 2,500,000 gallons per day.

12" water line cleaned for a Western R. R., at Creston, Iowa. Method: Mechanical and Hydraulic.

Pittsburgh Pipe Cleaner Company offers to the railroads a complete engineering and contracting service for cleaning water mains, sewers, tubes, water lines, sprinkler systems and fuel pipes.

Cleaning Equipment:

Electrically operated pipe cleaning machines
Hydraulic cleaning tools
Mechanical dragging equipment

Pipe Cleaning is from 40% to 80% lower in cost and ten times speedier than replacement.

Let us Help You Obtain:

Increased pressure and flow
Lower operating costs
Greater fire protection

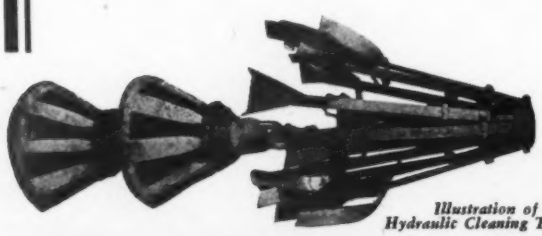


Illustration of 16" Hydraulic Cleaning Tool

JOB ANALYSIS
of a Typical Pittsburgh Pipe Cleaning Contract

●

Size of Main	16"
Length	24,816 ft.
Length of Run	24,816 ft.
Cleaning Time	165 minutes
Number of Openings	One at each end of line

	Lbs. Pressure at Pump	Gallons Water Per 24 Hrs.	Gal. Gain Per Day
After Cleaning	148	2,498,000	742,000
Before Cleaning	147	1,756,000	

Write us today for illustrated circulars with actual facts from the field and let us show how we can aid you.

PITTSBURGH PIPE CLEANER COMPANY
433 Melwood Street **Pittsburgh, Penna.**

THE "400" FLEET DELIVERS

ASSURED TRANSPORTATION

with SPERRY RAIL SERVICE

CHICAGO NORTH WESTERN LINE

Safety is the first consideration of all railroad operation. Maximum safety can only be attained by constant inspection and maintenance. One of the surest methods of testing rails is provided by the Sperry Rail Service.

The detector cars of the Sperry Rail Service regularly and effectively test rails in track. Equipped with the most modern apparatus, these cars and their highly-trained crews readily locate fissures, split heads, and other rail defects that could mean disaster if undetected. Once located, these defective rails are immediately replaced.

Under the severe conditions of wartime service, the rails of all systems are taking an increased hammering day and night. But with Sperry Rail Service doing its part, Chicago & North Western and the more than 80 other railroads using Sperry Service are delivering—assured transportation.

Sperry Detector Cars, during the past 15 years of commercial service, have proved to be the most efficient and effective means of testing rails in track.

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Today when "next day delivery" anywhere within a radius of 500 miles is a common accomplishment of railroads we are apt to view those early records with little appreciation, but the magnificent attainments of private enterprise as evidenced by our modern railways, sprang from competition with those early canals. The railroads had to prove themselves. Throughout the years of development they overcame many obstacles of equipment and did it with ever-increasing effectiveness, until today—even in wartimes—they are meeting the greatest demands of all time upon equipment and personnel, and doing it in a manner to thrill a nation dependent upon their facilities.

The perfection and maintenance of "track" has been no small part of the railroad's ever-increasing efficiency. Safe and speedy movement of men and materials depend

OF ALL THE CARS IN SERVICE TODAY

built in this country, yet the flourishing communities they served were soon left behind with the coming of faster transportation—the railways.

upon good roadbeds, vigilantly maintained. The Fairmont Motor Car was developed to provide dependable and rapid transportation for maintenance crews—an imperative need in these modern days of stepped-up schedules and increased speeds. That those Fairmont Motor Cars are fulfilling their important task in aiding the railroads is a matter of no little pride to their makers. Fairmont Railway Motors, Inc., Fairmont, Minn.

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By using the semi-mechanized method developed by Oxweld, a single operator is able to do this work effectively, and the second operator, ordinarily required, is freed for other needed work.

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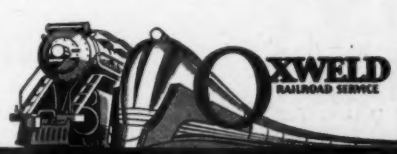

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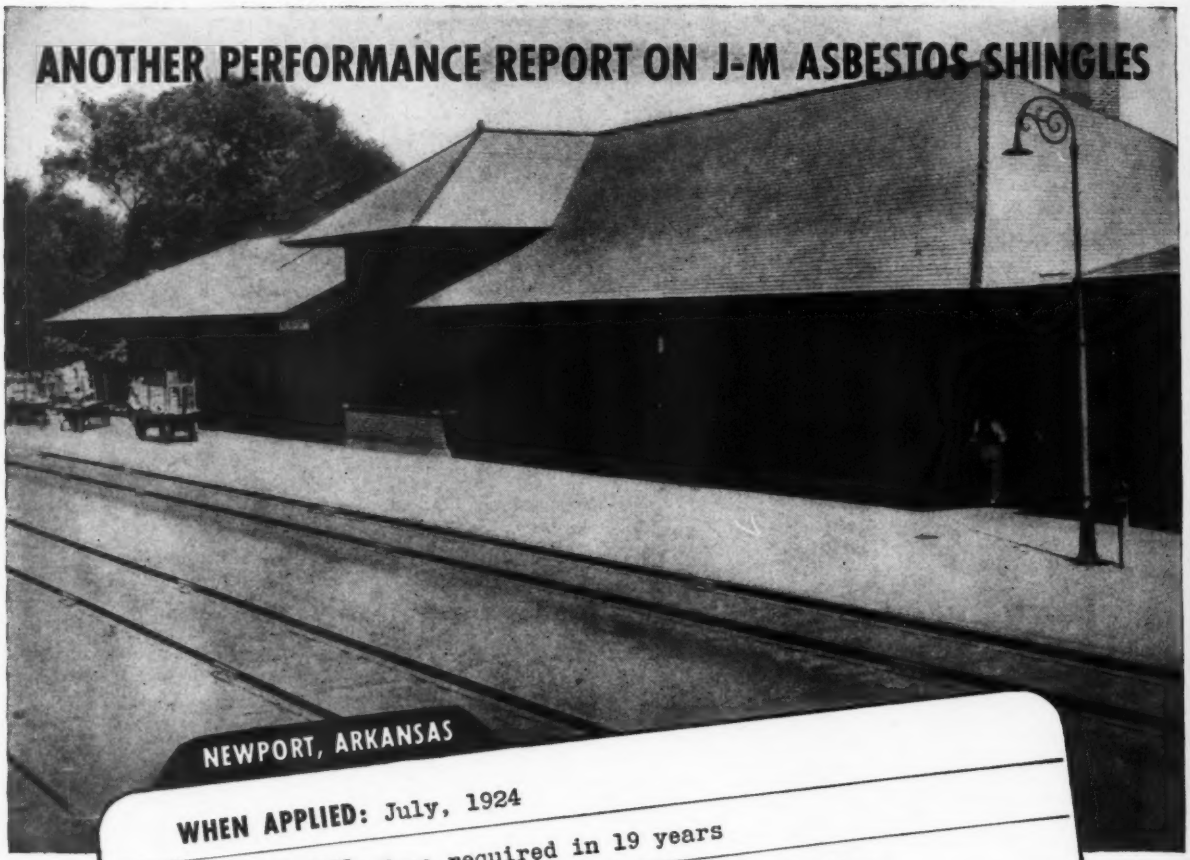
ANOTHER PERFORMANCE REPORT ON J-M ASBESTOS SHINGLES



NEWPORT, ARKANSAS

WHEN APPLIED: July, 1924

MAINTENANCE: None required in 19 years

PRESENT CONDITION: No indication of deterioration

REMARKS: 19 long years of diversified Arkansas weather . . . sudden overnight changes from cold, driving rain to blistering sun . . . have left no sign of wear or depreciation on the J-M Asbestos Shingles on this roof. And judging by the performance records of similar J-M roofs 25 and 30 years old, they'll still be laughing at the weatherman many years hence. That's because Johns-Manville Shingles, made of asbestos and cement, are not only fireproof but rotproof and permanent as stone. And they never require preservative treatment.

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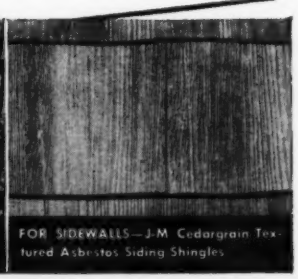

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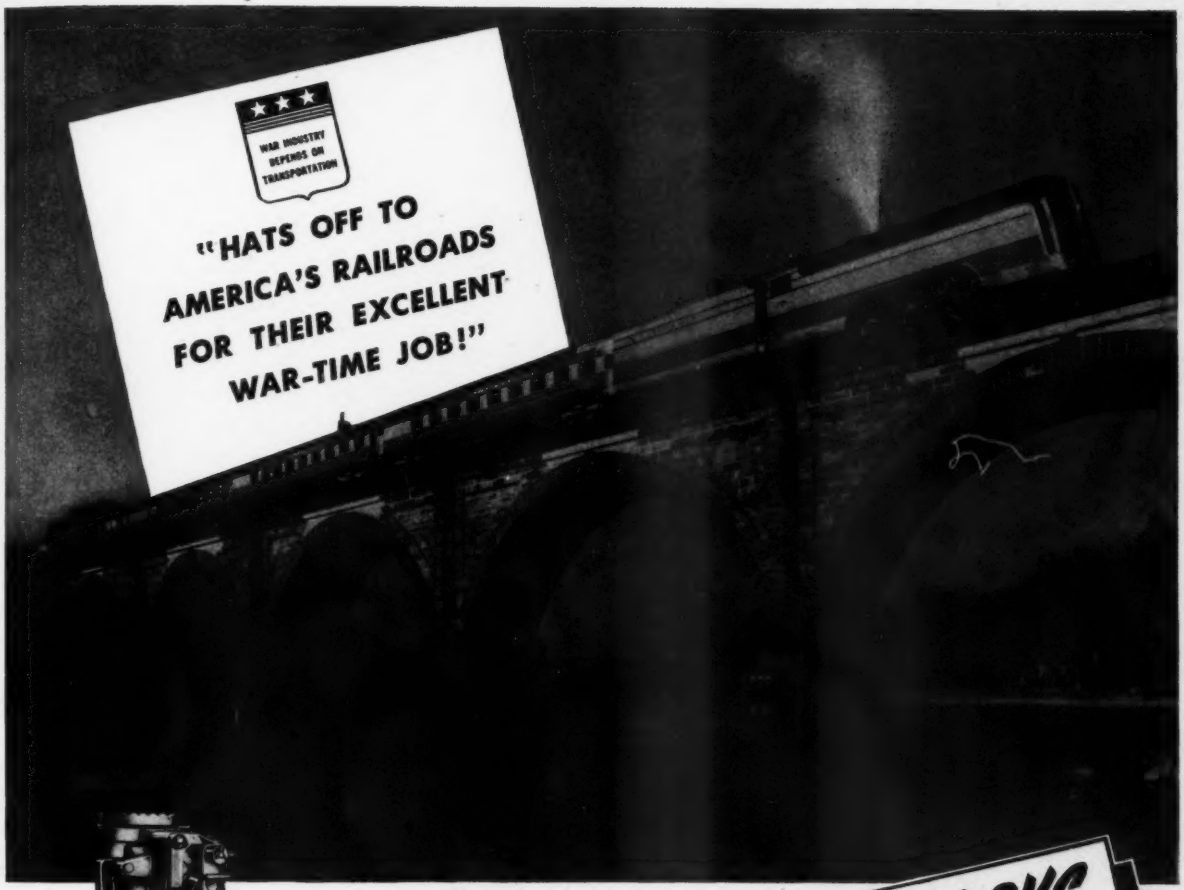

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No. 180 of a series

Railway
Engineering and Maintenance
SIMMONS-BOARDMAN PUBLISHING CORPORATION

105 WEST ADAMS ST.
CHICAGO 3, ILL.

Subject: Writing History

December 1, 1943

Dear Reader:

"I wonder if you realize the extent to which, month by month, you are writing the history of maintenance of way forces in this war? In each issue you describe and discuss the problems most prominently before the men in this field —your readers—and the measures that they are devising to cope with these problems. Thus you have recorded the increase in wear and tear from rising traffic, the evolution of materials' scarcity to its present status of organized rationing and, currently, the emergence of labor as our Number 1 problem.

"In the capacity of an historian, you are adding to the more widely appreciated service that you are rendering those of us who are on the firing line by bringing to us so promptly the thinking and the discoveries of other men in our field. The value of the printed record that you are writing can be realized best by one who has occasion to refer back to practices devised to meet the difficult conditions of the last war, as I have just had occasion to do."

This observance interested us greatly for it demonstrated that this discerning reader appreciates what we have long realized through our own daily reference to past issues and through the almost constant use that others make of our library. In these days when there is no place for wasted effort, it would appear self-evident that that supervisory officer makes greatest progress who surveys the experience of others and builds on their experience. The pages of Railway Engineering and Maintenance record this experience in the upkeep of railway tracks and structures. We suggest that you read them from this point of view as well as from that of a record of current interest.

Yours sincerely,

Elmer T. Howson

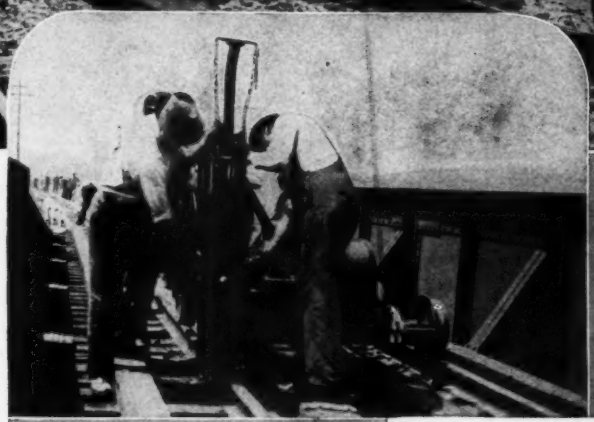
ETH:kw

Editor

MEMBERS: AUDIT BUREAU OF CIRCULATIONS AND ASSOCIATED BUSINESS PAPERS, INC.

Pull Spikes Easier and Faster

Three Nordberg Spike Pullers are being used on this large rail laying gang.



Pulling spikes on this trestle would have been a slow and difficult job if done with claw bars.

Spikes located in close quarters are easily pulled with this machine.

For rapid progress in rail laying, the Nordberg Spike Puller is an essential piece of equipment. In addition to speeding up the operation of getting out the old rail, only a fraction of the number of men are required as compared with pulling spikes by hand. With manpower shortage a serious problem, the use of this labor and time saving tool is doubly important. This tool also has the further advantage in that inaccessibly located and hard-to-pull spikes can easily be removed. Meet wartime traffic demands by putting the Spike Puller and other Nordberg Power tools to work on your track maintenance jobs.

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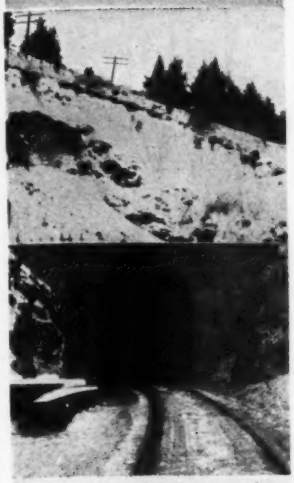

Railway Engineering and Maintenance

NAME REGISTERED U. S. PATENT OFFICE

DECEMBER, 1943

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Business Manager

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Railway Engineering and Maintenance

Passenger Service

Railways Eclipse All Previous Performances

The railways are establishing many noteworthy records in these critical days. Few are as outstanding and none is more spectacular, however, than that which is being made currently in passenger transportation, both civilian and military. With only half as many passenger locomotives and only two-thirds as many passenger carrying cars, the railways are now producing almost twice as much passenger transportation as in the pre-war record year of 1920; with slightly less equipment, they are producing approximately four times as much service as in 1940. This phenomenal record is being made possible by the greatest efficiency in the utilization of equipment that has ever been witnessed.

In the first place, primarily by reducing the time that these cars spend in shops and terminals for repairs and cleaning, the average mileage run by each of these cars per day has been increased from 168 in July, 1920, and 177 in July, 1940, to 293 in July of this year. In other words, each passenger carrying car is now running 74 per cent more miles each day than in 1920 and 69 per cent more than in 1940.

More Service Per Unit of Equipment

Each of these cars is also carrying more passengers per mile operated. In July, 1920, the number of passengers per car averaged 22.1; in July, 1940, it had declined to 14.8, while in July, 1943, it rose to 33.8. As a result, the amount of passenger service rendered per car (passengers carried one mile) per day rose from 3,726 in July, 1920, and 2,623 in July, 1940, to 9,911 in July, 1943.

Equally outstanding has been the record of passenger locomotive utilization. Passenger train miles per locomotive have risen from 116 per day in July, 1920, and 148 in July, 1940, to 188 in July, 1943. In the same periods, the average number of passenger carrying cars per train has increased from 4.5 in 1920 and 1940 to 6.2 cars in July of this year. As a result, each passenger locomotive increased its passenger-carrying-car miles per day from 522 in July, 1920, and 666 in 1940 to 1,166 in 1943.

By reason of the increased loading per car and the larger number of passenger-carrying cars per train, the average number of passengers per train rose from 99 in July, 1920, and 67 in July, 1940, to 210 in the same month of last year. And as a result of the increased daily mileage made by each locomotive, the passenger service produced by each locomotive rose from 11,419 passenger miles in 1920 and 9,906 in 1940 to 39,499 in 1943.

Thus, each passenger car produced 2⅔ times as much passenger service in 1943 as in 1920 and almost 4 times as much as in 1940. Similarly, each locomotive produced 3½ times as much passenger transportation as in 1920 and 5 times as much as in 1940.

This record in meeting a sudden and terrific up-surge in passenger travel after a continuous decline of more than 20 years, at a time when additional equipment was not to be had, demonstrates such outstanding versatility and adaptability among the railways in meeting new and highly difficult conditions, as should stimulate a high degree of pride in every railway employee. It should also key him up to the necessity for doing his full share in handling the still larger loads that are immediately ahead with the same determination and energy.

Fighting Storms

Help From the Military May Be Essential

MAINTENANCE of way men throughout the northern part of the country are seriously concerned lest the months immediately ahead bring storms of an intensity or duration that will tax their ability to cope promptly and effectively with them. They are especially concerned because of the record volume of traffic that is being handled by the railways, and of the imperative character of the major part of that traffic, and also because they realize that, despite advance planning and other efforts to be ready, they are less adequately prepared in at least one respect, to combat storms of serious proportions than ever before.

Like the wise and prudent military command that recognizes its weaknesses in the face of impending battle, and makes every effort to overcome these weaknesses, whether in equipment or men, maintenance officers recognize the strategic weakness of their position in the battle of winter, in both equipment and men, and are calling for what may prove to be essential reinforcements—reinforcements of their inadequate forces—if the need should arise, from the only source of manpower reinforcements in the light of the depleted labor markets of the country—the military forces.

Especially in terminal areas, where the threat of traffic disruption is greatest, the railways must rely largely upon switch heaters and manpower to keep their tracks open and traffic moving. Thousands of switches in yards and terminals have been equipped with heaters in the past, the number growing yearly as labor costs have risen and the labor supply has dwindled. Under more normal conditions, these installations of heaters would have offset otherwise essential manpower needs in part at least, but imperative as the need for further large-scale installations has been, the War Production Board, through its control of materials, has made it impossible for the railways to secure additional switch heaters. Even in some cases where authority to purchase heaters has been secured, that authority was received so late that it is doubtful whether the installations authorized can be completed and put into effective use this winter. As a result, many critical terminal areas of the country, inadequately equipped with mechanical heaters and stripped of the necessary manpower for emergency use, face the possibility of serious traffic tie-ups by snow storms, unless adequate means to offset this situation are devised and put into effect.

To those maintenance officers who have given this matter the most careful consideration, the one and only fully effective means lies in the temporary use of military forces in emergencies which are beyond the ability of the railway forces to meet successfully. Pointing to the precedent set by the use of soldiers in the fields and canneries during the last harvest season, where the aid given proved of great value in coping with an otherwise hopeless situation, maintenance officers see nothing incompatible with military rules or training in the emergency employment of army, navy or marine forces in fighting snow storms on the railways if that should become essential to prevent delay to or disruption of war traffic. In fact, with so large a part of present traffic vital to the successful operations of the military forces, it would appear logical for these forces to be ready and willing to step in to forestall any threat to their own supply lines from whatever cause, including unusually severe winter storms.

Whether this suggestion has gone beyond the general discussion stage is not known, but if it has not, it would be highly desirable, as suggested in a recent issue of the Railway Age, for the Association of American Railroads, speaking for all of the roads concerned, to work out with the military authorities an arrangement whereby their forces stationed near the larger terminals in the northern states can be employed in railway snow-fighting operations in the event that storms get out of hand and threaten vital war transportation. If this concerted action is not taken on behalf of the railways as a whole, and taken promptly, any action instituted by roads individually may prove ineffective, with serious consequences later this winter.

Order of the Day—

First Essentials Must Come First

IN spite of the fact that the conditions facing maintenance officers have been difficult during many periods in the past, and have required the careful planning of work to insure that the most important details are given first consideration, it has never been more true or important than now that first essentials come first. Short of manpower, materials and work equipment—critically short in many instances—the selection of the work that is to be undertaken at a specific time may be the deciding factor between efficient and safe operation and delays and accidents. Today, and just so long as inadequate manpower, inadequate materials and inadequate equipment remain, first needs must come first. Today, many worthwhile but not essential practices of the past are out for the duration. Today, cost must take second place, convenience in doing work must be disregarded, and improved appearance, for appearance sake, must be overlooked. While maximum efficiency in the use of manpower is essential, even that consideration cannot be allowed to interfere with the importance of doing first those tasks that insure maximum safety of train operation.

This rule, long a basic practice on the railways, takes on added significance each day as record-breaking traffic and heavier wheel loads continue to take their toll of the tracks and structures—a toll which cannot be made good in full because of shortages in manpower, materials or equipment, or all three. Today, the zeal with which a fissured rail is removed from the track, to the delay of practically all other work, must apply to many other operations. A fuller appreciation of this concept must dominate the thinking of all maintenance officers, from those who program the season's work to the individual foremen. In fact, larger responsibility in this direction rests upon the supervisory officer in the field—the roadmaster, supervisor and the foreman—than upon the higher officers who are in less intimate touch with detailed field conditions.

Today, it is not the track foreman who renews the largest number of ties per man day under a routine program who is the most valuable, but rather, the foreman

who renews the maximum number of ties per man day, where they are needed most, while not overlooking a weak section of track shoulder, a joint out of surface, a couple of rail lengths out of line, or a switch that needs adjustment. No more is the best bridge and building or water service foreman the one who operates on a fixed, set schedule, laudable as that might be under more normal conditions in the interest of greater efficiency and lower cost. Rather, today, the foreman who is most valuable is the one who, with initiative and judgment, adjusts his operations from day to day, and even within a single day, to do first those things that promote maximum safety of traffic. Important at any time, this practice is imperative today, and every foreman should be encouraged to realize this is his most important responsibility.

Usable Material—

Should It Be Shipped or Held?

IN the past, methods of disposing of usable materials released in routine maintenance or accumulated in the prosecution of larger projects, have varied between wide limits, depending mainly on the attitude of the supervisor. Some of these officers have made it a practice to return all usable material to the storehouse upon the completion of a job, or as soon as a sufficient amount has been collected to warrant shipment; others have kept every item for which they could foresee any use, and sometimes items for which they had no prospective use; while still others have retained only those that they could apply immediately.

There is always danger in retaining materials that might be needed, for the practice generally results in excessive local stocks and considerable waste, since, in most cases, the items so retained are not recorded and may soon be forgotten and never used. Again, if kept too long, some of them will become obsolete and, therefore, useless. A case comes to mind in which a cache was discovered which contained enough angle bars to lay almost a mile of rail, but which fitted a section that had not been in use on the division for 14 years. This incident has its counterpart on many roads.

A well-selected emergency stock is needed on every district, but this stock should not contain more materials than are actually needed, as determined by experience, for every surplus item represents waste. Material that lies idle for a considerable time invariably deteriorates and thus has less value when applied than it had originally. Although these considerations are important normally, their importance has been greatly enhanced by the conditions surrounding the procurement of materials at present. When materials are "tight", there is always a tendency to put away any surplus that may have developed, on the theory that when the items are needed it may be difficult to obtain them. This practice leads inevitably to unwise accumulations, and at present to the unnecessary purchase of critical materials.

Recent intensive scrap drives which have been carried out on most roads have uncovered many forgotten caches of materials, some of them badly deteriorated, some obsolete and a few reclaimable. During the next drive, which is in the offing, places that were not investigated during the previous one should be searched, for such accumulations are usually found in the most unexpected places. It may also be desirable to go over emergency stocks of materials to determine whether they are larger than the minimum requirements.

Track Inspection—

Its Importance Is Still Growing

FROM the beginning of the railways, periodic inspection of the track has been one of the essential activities of the maintenance-of-way department. With the inauguration of high-speed passenger service about 10 years ago, track inspection took on a new importance and the maintenance forces were stimulated to repair defects more promptly than had previously been the custom.

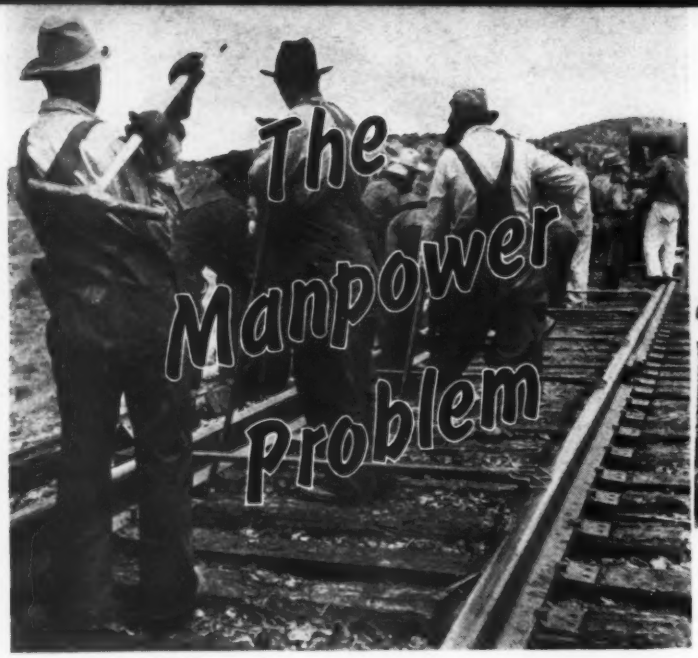
With the rapid increase in traffic volume and the higher average speeds of all trains which followed the outbreak of the war, track inspection has taken on still greater importance, for defects in line and surface as well as in rail and fastenings, are occurring with increasing frequency. Furthermore, where defects do occur they develop much more rapidly to the point where it becomes essential that they be corrected. Not a few maintenance officers have also observed that under high speeds, bolts and rivets in frogs and switches become loose sooner than formerly and must be attended to without delay.

Defects in line and surface that were scarcely noticeable when speeds of 50 and 60 miles an hour prevailed, cause increasing discomfort as the speed increases, and at 90 to 100 miles an hour may present a real hazard. It is essential, therefore, that inspection be frequent, regular, detailed and thorough and that defects that are found be corrected without delay, before they have grown from the incipient to the obvious stage.

For the post-war period, the railways are planning wide extensions of passenger service of the character that was under development prior to the beginning of the war. We will undoubtedly see more passenger trains than in recent years, and both maximum and average speeds will be higher. In addition, freight service will be improved correspondingly, although the number of trains may be less than at present, and speeds will be maintained well above those of today.

If these predictions come true, and there are sound reasons for believing that they will, still greater refinements in track maintenance will be necessary. While it is probable that the track will not receive as much abuse as it is now getting, materials will be less difficult to obtain, the demands for safety and smooth riding will be far more insistent, and the requirements for inspection will become still more rigorous than at present.

High-speed passenger trains came upon the maintenance force almost without warning, catching them largely unprepared to meet the new problems they imposed. But they are now familiar with the requirements for today's speeds and should be able to adapt themselves to those of tomorrow. However, they should give earnest consideration to the demands that are sure to be made upon them in the near future and begin now to plan for the new conditions, so that they will not be unprepared when the next step in development takes place.



Boys, Mexicans, Women, Japs, Indians, Part-time Workers

A Bird's-Eye View of the Railroad Manpower Situation

By Edwin M. Fitch

Assistant Director,
Division of Transport Personnel, O.D.T.,
Washington, D. C.

THAT the manpower problem is the Number One problem of war industries, and of war-essential industries generally, is repeated now far more often and with much greater emphasis than it was a year ago. In spite of that, you in the bridge and building and water service departments of the railways have held your own. In June, 1941, there were 39,700 employees in your department; in June, 1942, 42,800 employees; and in June, 1943, 43,100. The July comparison is less favorable, since it showed a seasonal gain last year which was not quite equalled this year.

If the statistics tell a true story, you have done particularly well in skilled occupations. The most important of these, of course, is bridge and building carpenters. In this category, the employment gain this year over last has amounted to about 1,400 workers. The increase amounts to 10 per cent of your present carpenter force. You have also increased the number of employees among painters, masons, bricklayers, plasterers and plumbers, portable steam equipment operators, and pumping equipment operators.

Laborer Situation Deteriorating

The real story of the difficulties encountered during the last year is revealed by the statistics of helper, apprentice and laborer occupations. In such occupations employment has fallen off much more sharply than is good for the bridge and building department. In terms of number of employees, maintenance of way and structures helpers and apprentices have fallen off nearly 15 per cent, and maintenance of way laborers, other than trackmen, 18 per cent. Again, if the statistics tell a true story, it is these less skilled, less well-paid occupations, that have presented your most serious manpower problem during the past year, and which will present an even more serious problem during the coming year.

Since I addressed your meeting last year, the Railroad Retirement Board has inaugurated a system of reporting expected gross hires in the railroad industry by month and by occupation. These reports show labor needs rather than labor shortages, so that they represent the number of men you would like to hire rather than the number of men you are short. Even so, they indicate a deteriorating manpower situation. Estimated gross hires for the current month in the bridge and building department totaled 1,140 in February, 1943, 2,754 in August, and 3,485 in September. Needs for maintenance of way and structures helpers and apprentices increased from 615 in February, 1943 to 1,520 in September, and for laborers, from 140 in February, 1943 to 499 in September. In these Retirement Board reports, the need for bridge and building carpenters has likewise shown an increase from 300 in February, 1943 to 1,193 in September. During this same period there have been a few lay-offs, but the number has been small and is insignificant.

On the assumption that the man-hour productivity of employees has not decreased, you have gained a substantial addition to your working force during the last year through increases in average hours worked. Even in 1942, the men in your department were working 50 hours per week or more on the average, a substantially greater average number of hours than in almost any other department of the railroads and far greater than in most war production plants. This average increased between June, 1942, and June, 1943, to 53 hours per week. On the basis of the hours in effect in June, 1942, this represents the equivalent of adding 2,800 workers to the payrolls. With a total employment of some 43,000, this has meant a very considerable addition to your working force in man-hours.

Turnover Problem

When the labor needs of the railroad industry are compared with new hires, it is obvious that the Number One manpower problem of

Older Men Are All Being Employed in Maintenance of Way and Structures Work

This article comprises abstracts of four addresses on the manpower problem, presented before the American Railway Bridge and Building Association's Wartime Conference at Chicago on October 20. E. M. Fitch, assistant director, Division of Transport Personnel, O. D. T., describes the over-all labor situation and its effect on the railway labor supply; W. G. Powrie, engineer maintenance of way, Chicago, Milwaukee, St. Paul & Pacific, tells how his road secured help from high school boys; L. E. Peyser, principal assistant architect, Southern Pacific, describes the methods used on his road to get part-time and week-end help from business men, students, etc.; and Malcolm Young, track supervisor, Pennsylvania, tells of his experience with the employment of women in track work

railroads, as for many other American industries, is the problem of turnover. If turnover can be reduced, even by rather small percentages on the average, and the present rate of new hires continued, there should be little labor shortage in the railroad industry, except in the most critical areas of the country.

A compendium of letters from workers in a recent issue of the Reader's Digest indicates the major reasons for their dissatisfaction with their jobs. Almost every one of these letters indicated that the worker's major difficulty was because of his foreman. I think that it is quite generally recognized that the foreman is the key to any program of reducing turnover. There are, of course, many reasons for worker transfers with which the foreman has nothing to do and over which he has little control. At the same time, a foreman who intelligently appreciates and sympathizes with the work problems of his gang, and who knows how to be firm and decent at the same time, can go a long way toward counteracting the motives which lead employees to quit.

I would like to suggest that the training agencies of the War Manpower Commission be called in for help. The carrying out of practical, down-to-earth plans for foreman training constitutes a major contribution of the Training-Within-Industry division. Foremanship courses are also available through public vocational schools. There are field representatives of War Manpower Commission training agencies in key cities throughout the country. Your division officers should get in touch with them and see what can be done toward instituting a program of short, practical courses for the training of your foremen.

Recognition of the problem of turnover has placed a great deal of emphasis upon the importance of exit interviews. I realize that the railroads have not had personnel departments which would lead naturally to the installation of such devices as this. Nevertheless, I think it is perfectly possible for division officers to place on certain of their supervisory officers the responsibility for conducting an exit interview with every man who gives notice of his intention of quitting. This will save some men to your departments, and it may also put the spotlight on some employment conditions which, if altered, will reduce the reasons for quitting.

My third suggestion has to do with housing conditions. A recent issue of Collier's contained a rather terrifying article on housing, living and recreation facilities in war-boom towns. The railroads must serve those towns and some of your bridge and building men have their headquarters there. Most of the bad housing conditions are, of course, associated with the large influx of new workers into war plants. However, there have been reports from all over the country of housing situations which have affected railroad workers, and which, in some localities, have made it exceedingly difficult to keep men on the job.

Replacement Schedules

Generally speaking, the railroads have fared well at the hands of local Selective Service boards. At the same time, the last year has seen some developments that were not good for your industry. We have come to the conclusion that the proper way for the railroads to solve their Selective Service problem is to join in with the Replacement Schedule program of Selective Service.

The Replacement Schedule procedure gives State Selective Service officers an opportunity to look at the manpower problems of a given division of a railroad and to make a much more intelligent decision as to the number of men who should be drawn into military service. Its net result is a kind of agreement between railroad officers and Selective Service officials as to which men will be called to military service and which will remain on occupational deferment, and for how long. Once such a schedule is submitted and approved by the State Selective Service director having jurisdiction, Forms 42-A are filed for the individuals for whom occupational deferment is indicated by the road's replacement schedule, and Selective Service is then able to give a fairly good guarantee that these requests for deferment will be honored.

Critical Occupations

Another Selective Service development during the last year has been the issuance of a list of 149 occupations declared to be critical on the national basis. The issuance of this list by no means supersedes the previous lists of essential occupations issued by the War Manpower Commission and its Bureau of Selective Service. It does mean, however, that the individuals in such occupations are being given and will be given a greater amount of Selective Service protection than is true of the essential occupations not included in the critical list. There are a fair number of railroad occupa-

tions in this list, but, except for foremen and professional staff, there are few which are applicable to the bridge and building department.

These critical occupations have a double significance. Not only will individuals in such occupations be entitled to greater Selective Service protection, but they will also be subject to more stringent hiring controls established by the War Manpower Commission. In the case of the railroads, these controls are largely exercised by the Employment Service of the Railroad Retirement Board, acting in this respect as an agent of the War Manpower Commission.

The drafting of pre-Pearl Harbor fathers is also, of course, a new development during the last year. Few have yet been inducted into military service and it is my hope that Selective Service will call pre-Pearl Harbor fathers from less essential industries before they are called from more essential industries like the railroads. In this connection, State directors are telling companies which are preparing Replacement Schedules—and this includes the railroads—to put pre-Pearl Harbor fathers in the list of employees to be deferred for at least six months. Occupational deferments cannot be granted for more than six months, although they are subject to renewal.

Stabilization Plans

Another development during the last year, of considerable importance to the railroads, is the extension to them of the stabilization plans of the War Manpower Commission. I hope you are familiar with the booklet issued recently by the Association of American Railroads, entitled Railroad Manual on Employment Stabilization.

For the most part, these plans have been developed locally to meet particular local situations, although they must conform to certain minimum national standards. In brief, the minimum standards to which all plans must conform, provide that a worker may not transfer under ordinary circumstances from an essential activity to a less essential activity, and that he can only transfer from one essential activity to another after receiving a statement of availability, in the case of the railways, from his last employer or the Railroad Retirement Board. There are also regulations governing a transfer to a job with a higher rate of pay. Such transfers are prohibited unless they comply with the provisions of an applicable employment stabilization program.

The intent of the regulations under this plan is to reduce the amount of turnover due to resignations through the device of the certificate of availability and to give the railroad industry, through the Railroad Retirement Board, first call on workers with previous experience in the railroad industry.

On the Pacific coast, and in an increasing number of areas in the East, a further step has been taken by requiring certain classes of workers, or all workers, to be referred to employers only through the United States Employment Service or agencies authorized to make referrals by the War Manpower Commission. In the case of the railroad industry, the Railroad Retirement Board exercises the function of the United States Employment Service. This system requires the establishment of a scheme of labor priorities. Such priorities are ordinarily determined through a labor requirements or manpower priorities committee composed of representatives of government agencies which, either in and of themselves, or through private companies over whom they have jurisdiction, are claimants for manpower.

When I spoke to you a year ago, I emphasized the fact that the railroads of this country are still privately operated, and that the primary responsibility for the provision of adequate railroad transportation lies in the hands of railroad managements, working within the limits laid down by the Office of Defense Transportation, or, in the case of manpower, in most respects, by the War Manpower Commission. It is still true of manpower as of railroad operations—that the primary responsibility is upon you. Your record of accomplishment is a matter in which you should take great pride—a pride shared by us in the Office of Defense Transportation.

There are many signs that the difficulties of next year, in terms of manpower, will be greater than during the last year. Director Eastman of the ODT remarked recently that the next six months will constitute the crucial period, and that if we can get over that period with success, there is some hope that no future time will present dangers of the same seriousness. Our watchword must be co-operative planning toward a goal which we are all determined to achieve—co-operation between labor and management and the Office of Defense Transportation—co-operation between railroads and the War Manpower Commission—and between railroad labor and management.

In many respects, it seems to me, it is a good thing that the war has imposed the necessity of greater co-operative action, for it has demonstrated that, by acting together, the railroad industry, including both labor and management, and the Federal agencies concerned with railroads, have been able to achieve results which a few years ago would have been considered utterly impossible. We have learned lessons in meeting these various problems which are bound to result in permanent improvements.

High School Boys Make Good in Maintenance Work

By W. G. Powrie
Engineer Maintenance of Way,
C. M. St. P. & P., Chicago

THE manpower shortage is requiring maintenance of way men to use their ingenuity to the utmost. Many plans have been advanced for providing more labor for the railroads, such as the use of Japs from relocation centers, the importation of Mexicans, the employment of women, and a general relaxing of physical standards and age limits in recruiting men. One other source of help which has been tapped by many roads is the employment of high school boys.

Child labor regulations in many states allow the employment of boys 16 and 17 years of age on railroad maintenance work, with varying restrictions as to the number of hours they may be worked. In most states, the boys must secure permits to work from the proper state or municipal authorities. In one instance, where the state statutes did not permit boys under 18 years of age to engage in railroad maintenance work, the regulations were amended by special order for the duration of the war so those 17 years old, and

later 16 years old, could be employed on such work.

Recognizing the serious effect that the existing labor shortage could have on the proper maintenance of the railroads, the Industrial commission of that state made the following comment in issuing its special order authorizing the employment of boys 16 years of age.—"The fundamental reason for this order is the acute shortage of men available for the work, due largely to the lowering of the draft age to 18 and the acceptance into some of the armed services of boys 17 years of age.

"Information collected by the commission since the adoption of the initial order seems to show rather clearly that the gravity of the situation was under-estimated at the time of the adoption of that order.

"Despite the lowering of the age to 17 for track repairers, it has been found necessary, at least in some cases, to employ women at this work. However, such employment of women offers no real solution of the vexing problem.

"There can be no difference of opinion regarding the vital necessity of keeping our transportation systems in good working order at this time. This cannot be done in the absence of an adequate labor supply.

"The only solution of the problem seems to be in the employment of boys 16 to 18 years of age instead of limiting employment to the group 17 to 18. Even this may not, and probably will not, wholly solve the problem."

In those states that still prohibit the employment of boys under 18, similar action would be helpful. The employment of boys during their summer school vacation period and on week-ends has aided the completion of maintenance programs on all roads that have used them.

1300 In Track and B. & B. Work

Early last spring a number of our division maintenance officers called on the high school authorities in the villages and cities along their divisions to secure assistance in recruiting boys for work on the railroad. Part-time work was offered in bridge and building crews and section gangs during the months that school was in session, and full-time work was offered during vacation periods. After a frank discussion of rates of pay, working conditions, transportation facilities, and the supervision to be provided for the welfare and safety of the boys, hearty co-operation was secured. This co-operation on the part of school authorities was of great assistance in convincing the boys and their parents that due care would be used in working them, and that they would be treated as boys should be treated.

Part of an Extra Gang of High School Boys Surfacing a Newly-Constructed Second Main Track on the Milwaukee

By April, about 500 boys were lined up for week-end and summer vacation work, and more than 200 were actually working Saturdays and Sundays. With the closing of the schools in June, the recruiting gained momentum to the extent that we had more than 1300 minors on the maintenance of way payroll by the end of that month. This included those employed in track work as well as in bridge and building work.

At one engine terminal where we had quite a large program of water supply work to do, we had a crew of 25 boys installing pipe lines, hydrants, concrete pits, etc. This job probably could not have been done if it had not been for the boys.

Where a number of these young men could be worked in a crew, we enlisted the services of the high school coach or one of the teachers to act as monitor. These monitors were of great assistance in handling the boys, especially in preventing "horse play," practical joking, and in warning them against unsafe working practices. Furthermore, they formed an outlet for any grievances or suggestions on the part of the boys, with the result that sometimes desirable changes were brought about in the interest of both the boys and the work.

Safety of First Importance

Safety is a major consideration in the employment of boys on the Milwaukee, and all other factors are subordinated to that end. Wherever employed, the safe conduct of the boys is put up squarely to the foreman. When first employed, and daily thereafter, the boys are instructed in safe working practices. They are required to familiarize themselves with safety rules, and each day before starting work the foremen impress upon them the great importance of following these rules.

To the extent possible, the boys are assigned to work for which they are best fitted physically. Furthermore, in doing some of the heavier jobs, more boys are used than the number of men usually required. The safety of the boys is a matter of real concern to us because of their lack of experience, and because they are bubbling over with pep as all husky American boys should be. The only satisfactory safety record, of course, is a total absence of injuries. We did not reach that goal, but had surprisingly few injuries among the boys. None of these injuries were of a very serious nature.

One important consideration in the employment of boys is the supervisory force in the crew. In the first place, an increased number of lead men and assistant foremen is needed. In addition, the foremen must have great patience and a keen understanding of boys. They will not respond to gruff orders, but will do anything for a foreman they like. Their reactions are quick; their likes and dislikes strong. Some of the most successful foremen had the same group of boys with them steadily throughout the summer. Others experienced a heavy turnover.

Boys doing bridge and building work were taken into the regular camps of the bridge and building forces, but for some track gangs composed entirely of boys, special camps were provided. These camps were equipped with electric lights, running water and shower baths. An effort was made to serve the type of meals the boys liked, which, incidentally, we found to be considerably different from the meals required by regular extra-gang laborers. At least twice each week transportation was provided to take the

boys into a nearby town so they could go to a moving picture show or to the corner drug store for a soda. Recreation is important with the boys, and facilities for suitable recreation are necessary in boy camps.

Good Power Tool Operators

The quality of work done by these young men is satisfactory. Their lack of experience and skill, of course, makes their progress slower than that of a crew of experienced men, but by working them in with a sufficient number of experienced men they do well. They learn rapidly and are willing and eager to get something accomplished. It is especially noticeable that they like and excel in handling any type of power tool. The boys seem to have a natural ability to learn to operate such tools.

In bridge and building work, the boys are employed largely as laborers and carpenter helpers. On most bridge and building jobs the number of unskilled workers who can be employed to advantage is limited. On these jobs there is not the same opportunity to use large numbers of inexperienced boys as in track work. Experienced bridge and building carpenters and steel bridge erectors are needed, and that is where the labor shortage shoe pinches tightest. The more experienced carpenter helpers can be elevated to carpenter rank and their places filled with unskilled men or boys, but there is a very definite limit to the help that can be secured in this way.

Week-End Work

When the fall school semester opened, we lost the full-time services of the majority of the boys we had employed during the summer. They have been encouraged to remain with us for part-time and week-end work and many are doing so. The help to be gained through the use of part-time workers during the winter months will be quite important to us, and will be exploited fully. In areas where we have a critical shortage of labor, I believe we can prevail upon the school authorities to release the boys from school for short periods to assist in emergency work. This was done in a few instances last winter.

While we all deplore the conditions which make the use of boys 16 and 17 years of age so important to us at this time, we can take satisfaction in the fact that by providing healthy, muscle-building outdoor work for them, we are training some of the world's finest football teams of the future, and, even more important, we are accomplishing much needed work and are training a grand lot of railroad men for the future.

Part-Time, Week-End Workers Aid Substantially

By L. E. Peyser

Principal Asst. Arch.
Southern Pacific,
San Francisco, Cal.

DURING 1942, when a Southern Pacific main-line trestle caught fire, the agent at a nearby town appealed for assistance to the local volunteer fire department. The immediate response and effective work of this organization saved the greater part of the structure. The superintendent of the division upon which this occurred was greatly impressed by the way this organization had mobilized its manpower to fight the fire and reduce delay to important military and civilian trains. He was still thinking about it a few months later when, because of a shortage of freight handlers, a large yard began to choke up with freight cars that were waiting to be unloaded.

On an impulse, he communicated with the agent, explained the problem and asked what he thought might be done to get local people to lend a hand again. The following Sunday, the agent put a total of 40 college professors, bankers, storekeepers, clerks and farmers aboard a train for the short ride to the choked yard. A week later he dispatched these same men and 60 more. The cars were unloaded and the jam was broken so that the yard could function normally to handle the huge volume of military and other freight that passes through it. Asked how he had recruited the men, the agent said: "I just walked down Main street and told them we needed some help."

A little later, the same group helped out on a few Sundays, handling baggage at another point. Following this, as their latest and perhaps most unusual job, these same men helped relieve a serious shortage of track maintenance men, and on each Sunday, about 45 men have been working from eight to ten hours swinging picks and shovels and handling tampers. Practically all of them are "white collar" men during the remaining six days of the week, but they were eager to do a day of real war work for prevailing laborer's wages on the seventh.

Appeal Broadcast

This local experiment having been so satisfactory, the idea was broadcast, and business and professional men in other towns and cities along our lines where trackwork was needed, were asked to sign up for week-end work. The response was both gratifying and somewhat surprising. Students from universities, junior colleges and high schools made up the bulk of these temporary forces, but workers from practically every business and profession were represented. These patriotic week-end workers came in response to advertising appeals placed in various cities on our lines, in some cases to announcements on local radio stations, and in others to personal appeals by station agents in their communities.

Furthermore, letters were addressed by our management to local bodies, such as chambers of commerce, telling of our needs and the approximate number of men that could be used to advantage.

The success of the campaign is reflected in the following tabulation of man-days worked by these week-end workers, Sundays, over the entire Pacific Lines:

Date (1943)		Man-days
April	4	4,16
	11	4,40
	18	4,52
	25	3,50
May	9	3,62
	16	3,58

Subsequent drops occurred, due probably in large measure to annual vacations and to students obtaining full-time jobs during their vacation periods. Adding to this, the seasonal demand for farm, vineyard and orchard workers, widely publicized in California, has reduced considerably the available pool of possible recruits.

The work performed by these week-end forces consisted principally

Palo Alto (Cal.) Businessmen and Students Doing Week-End Work on the Coast Division of the Southern Pacific

of spot surfacing track, cleaning ballast, laying rail, raising track, installing switches, making tie renewals, cutting weeds along the right of way, unloading crushed rock from cars and other routine tasks. The work performed has been satisfactory, but the plan must be considered as a relief measure only, and not in any sense as a complete solution of the problem of track-labor shortage. None of this week-end labor was used in bridge, building, water service or welding work, which requires skills not readily available in men without previous training in these crafts.

Other departments are availing themselves of help from this source, particularly the stores department, where part-time or week-end workers are used to load supplies, unload scrap, sort scrap and to unload and load lumber. In our wood-working mills, a limited number are performing the simpler mill processes which do not require the use of power-driven tools, and some are employed in the manufacture of small pre-fabricated structures. In this case, if skills are discovered in the men, they are used to the best advantage, with consequent greater remuneration. At each of two points, 50 to 75 men are employed each week-end in this type of work, and a smaller number of men are employed at each of several other locations.

Extra Gang of Women Makes Good on the Pennsylvania

By Malcolm Young

Track Supervisor, Pennsylvania
Warsaw, Indiana

WE first started hiring women as crossing watchmen. During the first two months we placed nine of them on crossings through the town of Warsaw, Ind., but during this time two of them said that the work got on their nerves, and we had to replace them. Six of this original group are still working and are doing very satisfactorily; however, some of them do not work as regularly as the men whom they replaced. Our chief problem in using women has been to educate and qualify them for the work. At first we had complaints from drivers because the crossing gates were left down too long before and after trains but, with experience, this difficulty entirely disappeared. We have never had an accident at a crossing protected by a woman which was in any way her fault.

When we first established on my territory a women's extra gang to do track work, which was in December, 1942, a few of our men objected to our employing them for this work on the grounds that they did not do as much work as the men, but were receiving equal pay. Finally, we brought this matter to a head at a meeting and declined to abolish the women's extra gang. The upshot of the matter was that one man quit while the women stuck. Since that time there has been less and less criticism of their work.

We started the track gang by hiring two women who were relatives of men who had been railroaders for many years. Since then we have built up the gang to twenty-five. There has been less turnover in this gang than in any other extra gang on the subdivision, though the absenteeism has been just about as bad. The women working for us now are about equally divided between those who have come to Indiana recently with their husbands or other relatives. We have found that keeping families together is one of the most effective ways of holding our labor. We have encouraged men moving into our territory to bring their families and to settle near their headquarters. We have tried to help them find and rent homes, or, if in the country, to find small farms.

One man moved to Warsaw last year and since has been joined by his wife, two sisters-in-law, a brother-in-law and his brother-in-law's wife; all six of them are now working on the Pennsylvania tracks. Two more of this man's relatives are coming up from Kentucky soon to work, and plan to bring their furniture.

Have Accomplished Much Work

Starting the women's gang in December, we had some trouble during the cold months immediately following finding suitable jobs for the women to do. We made a few false starts, but during the winter the gang levelled and board-lined six miles of crushed stone ballast; loaded and unloaded all cars of material, except those handled by work trains, including scrap, splices, crossties, tie plates, tools, etc.; cut all of the brush along ten miles of right of way; shoveled snow from platforms and sidewalks and swept it from switches; and helped lay two miles of 100-lb. rail. On this last mentioned work, they unloaded and loaded all of the material involved, except the rail.

The work they like least is levelling stone ballast. They prefer work that they know is actually helping to keep the railroad running. They want to feel that they are really helping to win the war.

Not Amazons

These women are not Amazons; none of them can spike ties, except one, and she isn't very good at it. They are white, and of various weights, from 105 to 180 lb. They like the work and like working on a railroad.

The foreman in charge of the gang has been more largely responsible for its success than anyone else. He started the gang, stuck with it, and

(Continued on page 967)

Railway Operating Battalions See Service Around the World*

Officers and men from many roads are in the thick of the fighting and in obscure places from the Arctic to the tropics. Many acts of heroism have been performed

By Lt. Col. Robert A. Radford

Chief, Engineering Branch, Railway Division, Office of Chief of Transportation, United States Army

PUT a railroad man in uniform and he will look like a soldier after the rough edges are buffed by basic training. It is a matter of experience that a railway battalion must be as well trained and disciplined as any other military outfit. This is because they are more widely scattered and on their own in small units so much of the time. A railroad man in a railway battalion, however, always remains a "railroader," from his G. I. shoes to the tanned visage under his G. I. cap. Make him a captain and he will still be a railroad man. Make him a general and he will continue to think in terms of rights of way, rolling stock and roundhouse engine pits.

The Military Railway Service is an integral part of the Transportation Corps of the army. Its units are organized and activated from the various railroads of the country and receive their technical training under the leadership of Maj. Gen. Charles P. Gross, chief of transportation. Such matters are handled through the Rail division under the direction of Col. John A. Appleton, general manager, New York zone of the Pennsylvania.

The units, set up on military lines, are constituted to function as a practical railway operating organization. The senior officer in a theater, usually a brigadier general, is general manager of the Military Railway Service and, with his headquarters, commands all rail operations. Directly under the general manager are a number of railway grand divisions, each commanded by a colonel, who functions as a general superintendent. In a typical railway grand division, there are three or four railway operating battalions, each commanded by a division superintendent; one railway shop battalion, commanded by a general shop superintendent; one railway base depot company, commanded by a storekeeper; and a railway workshop (mobile), commanded by a master mechanic.

The railway operating battalion is made up of four companies: Headquarters and Service Company, in charge of supplies, dispatching and signal maintenance; A Company, charged with maintenance of way, track and bridges and buildings; B Company, charged with maintenance of equipment, car repairs, and roundhouse activities; and C Company, with 50 train crews, in command of a trainmaster.

Railway units, once trained and shipped over seas, are under the commanding general of the theater. Such units have now gone forth to many parts of the world.

Are In Alaska

A military railway operating battalion has taken over the operation and maintenance of the White Pass & Yukon between the port of Skagway and Whitehorse, near the headwaters of the Yukon river. Last fall, Whitehorse suddenly became a focal point of strategic interest. The great Alcan highway was being constructed from near Edmonton, Alta., to Fairbanks, Alaska. Personnel, materials and supplies for the construction of this road could be moved both north and south from Whitehorse. The town was also to be the western terminus of a 450-mile pipeline under construction from the oil wells of Norman, up near the artic circle on the banks of the Mackenzie river.

The White Pass & Yukon, constructed in 1901 to serve those who sought their fortune in the Klondike gold rush, has been operated continuously by a London Syndicate. On October 1, 1942, the line was taken over by the War Department, under a continuing lease executed by the owners. By the terms of this lease the Transportation Corps of the army will operate the line for the "duration of the war and one year thereafter."

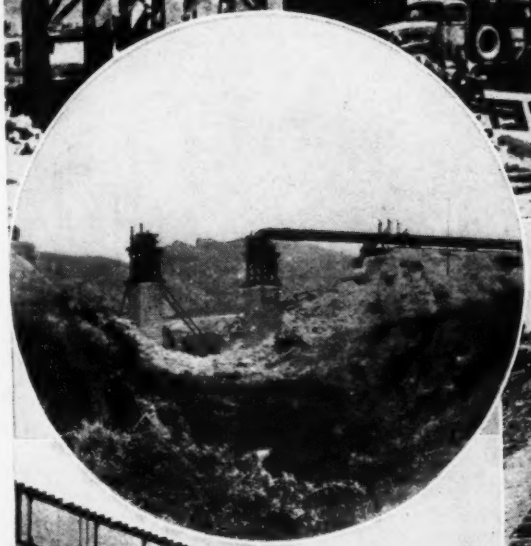
Never equipped to operate as a heavy freight line, and always harassed by severe winter operating conditions, it was physically impossible for the company to handle the suddenly imposed war load. With the execution of the lease, a military railway operating battalion, now commanded by Lt. Col. Herman C. Boughn (A. T. & S. F.), was given the task of rehabilitating the facilities and providing an adequate operating personnel. The battalion has moved over this famous route, with surprising regularity, the largest tonnage in the history of the road.

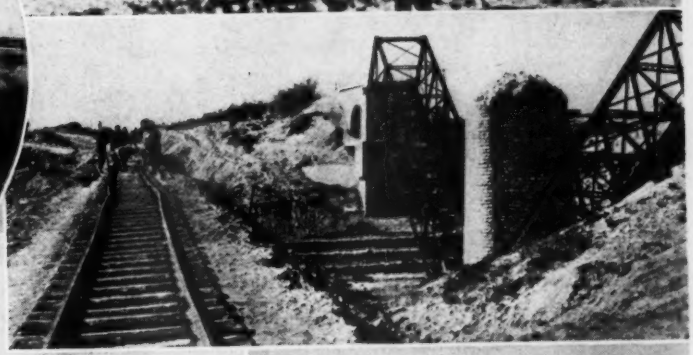
I went over this road with some others just before it was taken over. We had flown to Alaska and the pilot and co-pilot, who had flown us to Alaska, made the trip with us. On the way back they wanted to ride the locomotive. After a few miles and after passing over some of the bridges, where they could look right down into space from the engine, they gave it up and announced that hereafter they would stick to flying.

Needed Help

Many years ago, military experts proclaimed the control of Alaska as imperative to the control of the Pacific. Dutch Harbor, Anchorage and, later, Fairbanks, became sites for army installations. In 1914, Congress authorized the President to construct and operate certain rail-

*Presented at the war conference of the American Railway Bridge and Building Association at Chicago, on October 20.





Typical Views of What Faces the Military Railway Forces as They Move Forward

Official photographs of enemy bridge destruction on the rail lines in Tunisia, during the recent campaign in North Africa.

roads in the territory of Alaska, and in 1923 the Secretary of Interior was authorized and dircted to take over and operate the line between Seward and Fairbanks.

Confronted by heavy war traffic and an increasingly critical manpower shortage, the management of the Alaska Railroad submitted a request to the War Department for prompt and material assistance. A railway battalion, under Lt. Col. Herbert S. Huron (C. St. P. M. & O.), was moved in to supplement the civilian personnel in the maintenance, rehabilitation and operation of the line. A recent report from the Interior department's general manager of the Alaska Railroad brings news that this battalion is functioning with all the efficiency of an American railway organization. Because of much deferred maintenance, it has been necessary to establish maintenance-of-way camps throughout the length of the line. Fifty-three such camps, with 53 separate messes, are now being operated, and a post-exchange car operates regularly up and down the line. Just how long it will be possible to retain these battalions on these Alaska railroads will depend upon strategic requirements placed upon the Military Railway Service as the war develops.

Moving nearly a third the distance around the world and below the equator, in the Southwest Pacific, we find a tiny railroad on the French island of New Caledonia. This island, it will be remembered, was to have been the southwestern point of the Japanese great strategic crescent. Unfortunately for Tojo's plans, however, the Americans arrived there first. A railway operating company is now operating this 22-mile narrow gage railroad from the capital city, Noumea, to the dumps, warehouses and camps behind the port.

Also in Iran

From the two principal ports on the Persian gulf, Banda Shahpur and Khorranshahr, standard-gage rail lines run northward to join at Ahwaz and from there to the capital at Tehran, some 600 miles from the gulf. At Tehran one line of railroad extends in a northeasterly direction to the Caspian seaport of Bandar Shar. A second line has more recently been constructed to the northwest where it will eventually connect with the Russian railroad at Tabriz.

The Russian national railroads extending south through the Caucasus and Armenia, terminate at Tabriz. These are of 5-ft. gage. The unfinished gap between the Persian railroad and the Russian line is approximately 80 miles, over which all supplies are transported by truck train. At the close of 1942, arrangements were made whereby the operation of the lines between the Persian Gulf and the capital was turned over to the American Persian Gulf Command. By January, 1943, the operations of this railroad were in the hands of American military railway units, than commanded by Col. Arthur E. Stoddard and his Union Pacific grand division headquarters. With him were Lt. Col. George W. Welch (C. St. P. M. & O.), Lt. Col. John J. Clutz (Penna.) and Maj. F. E. Russel (S. P.) in command of battalions. Because there are heavy Diesel operations on these lines, the Diesel shop battalion, sponsored by the American Locomotive Company under command of Maj. W. C. Rogers, is also on duty in this area.

The Russian government's objective of munitions and supplies to be delivered by the Americans is being exceeded. This is in addition to the normal traffic of the country, plus our own and British requirements. The operation has gone far toward removing all evidence of friction among the allies on matters of supply to Russia. In truth, Tehran has become a meeting place of friends between American and Russian transportation men.

The operations at Iran will make an interesting chapter in the history of American railroading. Stories of mixed train crews, with absolutely no understanding of each other's language, have been told frequently. If it were not for the fact that all railroad men understand each other's needs and signs, it would be difficult to understand how an American doughboy conductor could impart orders to a bearded Persian engineer. The Persian personnel are retained in addition to our own troops in charge.

This railroad itself was splendidly built, but the methods of communication were totally inadequate. These have been remedied by installations of our signal corps, and with the operation and maintenance by railway operating battalions.

Among the Pyramids

A thousand miles to the west of the Persian gulf is the great ditch through the desert, known as the Suez canal. English-built railroads parallel the canal and extend westward to Cairo, Alexandria, and into the western desert to within a short distance of Tobruch. Because of a lack of water and coal, the operations of these Egyptian lines are largely by Diesel power. Here we find an American railway shop battalion under command of Lt. Col. A. R. Walker (I. C.). It has been the duty of this battalion to unload, assemble, keep in repair and, in part, operate American Diesel locomotives. A large part of their work is performed by semi-mobile units placed at strategic points between Suez and El Alamein. Their work is of such importance that their retention in that theater has been specifically requested.

As *Time's* correspondent (June 14, 1943) commented so aptly: "It certainly was a hell of a way to run a railroad, with German tanks pumping shells at your locomotives from ranges as close as 150 yards and demolition charges double-crossing your bridges before you could come to them."

So far we have been going around the world in giant strides. Before we come to the last, the most active and most interesting theater, I want to go a little bit into "planning." Some features of this matter I feel are of particular interest to this organization.

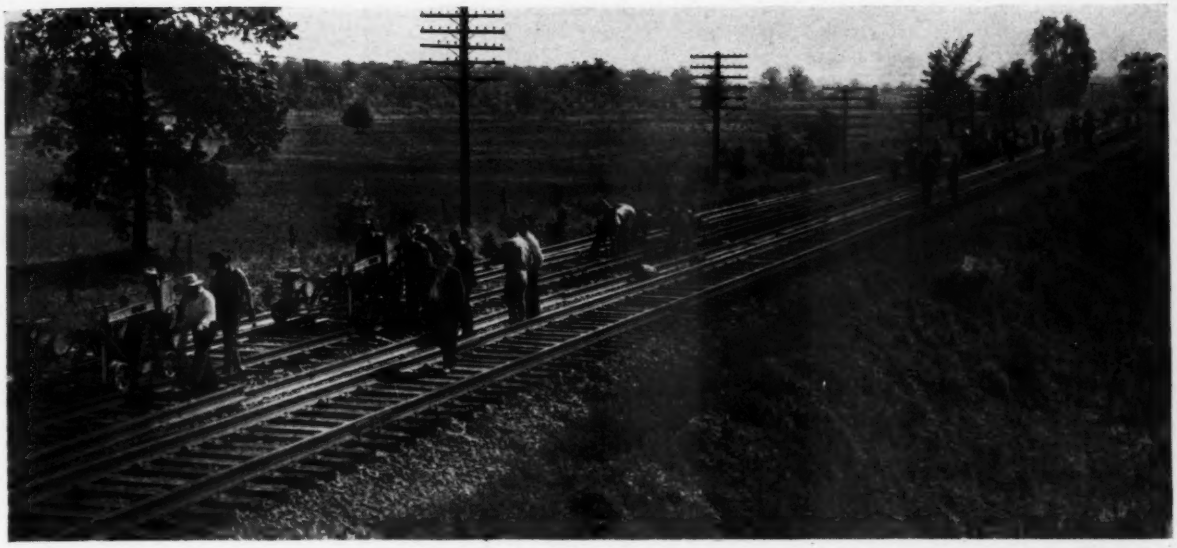
Before going into a new theater, complete physical details of the railroad facilities must be known. It is necessary to know, if such information is obtainable, the grades, weight of rail, kind of turnouts, number and kind of locomotives and cars and the number and sizes of bridges.

With this information available, the planner then figures out how much tonnage can be forwarded over a given line and the troop basis is dependent on this. The number and kind of military railway battalions must be planned and the kind and amount of material which must be available immediately. This, as you can understand readily from your own knowledge, runs into a multitude of items, all of which must be planned, stocked and available, months in advance.

One of the most difficult items for which to plan is bridges. If the kinds of bridges and lengths of span are known, it is a big step forward. The next and most difficult step is to make some sort of intelligent estimate or guess as to just what percentage of such bridges will be destroyed by the enemy.

Even where bridges have been destroyed, much of the material may remain usable. One of the German practices is to carry along I-beams or girders which can be welded in to replace broken chords. The American forces stock certain kinds of bridges for different lengths of spans. These include girder bridges, deck trestles and through trusses.

(Continued on page 966)



A View of the Demonstration Rail-Laying Operation Which Provided Some of the Scenes Shown in the Training Film.

Motion Picture Teaches Rail-Laying Practices on the New York Central System

Several years ago this road undertook an investigation of certain rail-joint conditions, which was later broadened to include all rail-laying practices. As the outcome of this study, a set of recommended practices for application throughout the system was developed, but the problem remained of putting them completely into effect. To help in accomplishing this end, a motion picture based on these practices was developed which, incorporating a number of distinctive features, is being shown before maintenance of way employees

SUPERVISORY officers and other employees on the New York Central System concerned with the laying of rail are now being instructed in the company's approved practices with the help of a motion picture, which is so filmed and presented that it is proving most effective as a medium for achieving better workmanship. Entitled "Seeing Is Believing," the film is notable for the thorough and detailed manner in which it portrays the rail-laying operation, and also because of two special features that are designed to enhance its effectiveness. One of these is the inclusion in the film of scenes showing improper, as well as proper, ways of doing specific operations, and the other is the provision of a voice commentary in the form of a synchronized recording that takes the place of the monotonous, time-consuming printed titles that would otherwise be necessary.

How It Started

This film is the end-product of a series of events that had their beginning early in 1939 with an investigation of certain rail-joint conditions that had become a source of some concern. Among these was the increasing incidence of "frozen" joints which were causing the contraction for considerable lengths of rail to be concentrated at individual joints, resulting in a few cases in the shearing of the bolts and the spreading of the rail ends at such joints. Because of the importance of this problem, the railroad decided to conduct an exhaustive investigation to determine its causes and to formulate corrective measures. To carry out this investigation a committee was appointed which was composed of C. B. Bronson, inspecting engineer of the system; G. T. Donahue, then assistant engineer on the staff of the engineer maintenance of way—system, and now assistant district engineer at Cleveland, Ohio; J. L. Cox, now division engineer on the Lines West of Buffalo; J. C. Ryan, now superintendent of maintenance equipment, Lines West of Buffalo; and John Yohe, Jr., now supervisor of track, Pittsburgh & Lake Erie.

In carrying out its assignment, the committee traveled widely over the system, making field inspections of rail-laying operations, in the course of which it found a number of variable practices in assembling rail joints. The committee also encountered a lack of standardization and the prevalence of some undesirable practices in other phases of the rail-laying operation, and as a result of these findings it was

decided to broaden the assignment to cover all the operations involved in laying rail, looking to the promulgation of a set of standards covering approved practices, organization and equipment throughout the system.

Uses Local Gangs

At this point it should be mentioned that it is the practice on the New York Central System for each track supervisor to lay the rail on his subdivision with a local gang composed of regular trackmen and such extra men as may be necessary. The specialized power equipment needed in the operation is circulated among the subdivisions as required. Under this system, it is apparent that the problem of training supervisors and other employees in recommended rail-laying practices is considerably more complicated than on those roads where all rail is laid by a limited number of system or regional gangs. In other words, if the recommended practices are to be applied uniformly and consistently throughout the system, it is necessary that practically every supervisory officer in the track maintenance department, down to and including track foremen, be familiar with them. It was necessary, therefore, for the committee to keep this phase of the problem in mind during the course of its investigations.

After the assignment of the committee was broadened to include all aspects of the rail-laying operation, it continued its field investigations over a period of years, during which time nearly 50 rail-laying operations were inspected, including return visits to certain gangs. The primary purpose of these inspections was to study the different methods, practices and equipment that were in use for the purpose of determining what improvements in procedure could be made, looking to the development of a set of approved standards incorporating the most effective and desirable practices. During these inspections, suggestions for improving the work were actively solicited by the committee.

From time to time during the investigation, progress reports on different phases of the subject were submitted, and in 1940 a tentative standard instruction book covering a recommended organization for laying rail, including equipment and force, was developed and widely distributed. These practices were set forth in the book by means of written instructions, supplemented by charts and diagrams. It was the hope that the use of this manual would result in the desired standardization of practices, but observations of rail-laying operations following its introduction indicated that the desired results were not being fully achieved.

With the thought that better results could be obtained if those concerned were permitted to view a practical demonstration of the recommended practices, it was decided to conduct such a demonstration and to arrange for it to be seen by division engineers, track supervisors and other track maintenance officers from all parts of the system. The demonstration was conducted in May, 1941, on the Michigan Central near Dearborn, Mich. A general foreman was chosen to organize the gang and supervise the operation who was known for his progressiveness and his receptivity to new ideas. In preparation for the demonstration, a "dress rehearsal" was held to give the members of the gang an opportunity to become familiar with their duties and the methods and practices to be used.

The demonstration was viewed by about 60 track maintenance officers, and to avoid over-crowding and interference with the operations, it was conducted on each of three successive days with about 20 of the spectators present each day. Prior to the demonstration, a detailed description of the gang, including a list of the equipment to be used and pertinent observations regarding the duties of each man, and various aspects of the organization and the methods to be used, was prepared and copies distributed to those present. One of the purposes of the demonstration was to obtain suggestions from those in attendance, and to this end each man was given a questionnaire containing spaces for entering pertinent comments regarding each phase of the work.

Idea for Film Is Conceived

It was in connection with this demonstration that the idea for a motion picture originated. At first it was planned to make a pictorial record of the demonstration in the form of a series of still pictures, but this led to the suggestion that a motion picture be made instead, which crystallized into a decision to produce such a picture for training purposes, for it was recognized that the demonstration would only partially accomplish the desired results, and it was realized that the practices would have to be brought home to others not present, such as track foremen and other maintenance of way employees. Accordingly, motion picture "shots" were made of the various operations, and these were later supplemented by additional scenes of other gangs working on various parts of the system.

It was not the intention to produce a picture for entertainment, but rather to obtain one that would constitute an effective instrument for educating employees in the proper and safe methods of laying rail, that is, one that would constitute an object lesson on how to do the work correctly and safely. If the picture was to be most effective, it was reasoned that, in addition to showing approved practices, it should also depict methods that are considered improper or unsafe. For direct contrast, scenes showing the proper and improper methods of performing particular operations follow each other closely, and close-up views are used liberally to illustrate details. All scenes in the film show actual rail-laying operations, and were made in such a manner as not to interrupt or delay the work. Every effort was made to eliminate evidences of posing on the part of the men doing the work; as a consequence, a highly realistic effect was achieved in film scenes.

Features of the Picture

To describe it briefly, the film consists of a series of scenes, arranged chronologically, showing the complete rail-laying operation from the advance oiling of the joints to the final inspection. It is not the province of this article to describe in detail the methods and organization shown, but it is of interest to refer to certain aspects of the picture that have served to enhance its effectiveness, and to make it applicable throughout a large system on which there may be considerable variance in local conditions.

One of these aspects, as mentioned above, is the inclusion of scenes showing improper or undesirable methods. These include views showing tie plates previously distributed in the center of the track—designated as an unsafe practice; the awkward use of the spike maul as a fulcrum under the claw bar when pulling spikes (the use of power spike pullers is recommended practice); several improper methods of removing bond wires; the lining out of rails in continuous strings—designated the old-fashioned method—in place of uncoupling the rails in the track; removing tie plates with an old spike as a lifter instead of a specially-designed hook; using the butt of a spike maul to drive tie plugs; applying creosote with a brush and bucket, instead of using a drum mounted on a dolly; several undesirable methods of handling and placing tie plates; carrying adzer heads on the shoulder instead of on a pole, rod or dolly; the cocking of bars by improper clamping methods; a poorly-organized splice-bar gang; the striking of joint bars at the ends to line up the bolt holes; the use of a hand

wrench with a long pipe extension to tighten nuts; the knocking of rails into position with a spike maul; the bending of spikes to line the rail; and a poorly-organized gaging gang.

Alternate Practices Shown

The film brings out the fact that the most desirable practice is to make the maximum use of power tools. However, in recognition of the fact that a complete complement of mechanized equipment may not always be available, approved alternate hand methods for certain operations are shown, such as driving spikes by hand. Alternate methods or tools for performing certain other tasks are also indicated, including the use of lining bars or rail forks to line out the old rail; the use of small or large circular tamps to drive spike plugs; the application of packing compound or other lubricants at the joints; and different methods of cutting rails for closure purposes. Throughout the film, emphasis is placed on methods of doing the various tasks easily, quickly and safely, and the admonition, "don't forget the goggles," appears several times in the script. Workmanship is considered to be of paramount importance, with speed a secondary consideration.

When the idea of the film was first conceived, it was contemplated that it would be a silent picture with the usual printed titles. However, it was apparent that, if the film were to accomplish its purpose, a large number of such titles, appearing in rapid succession, would be required, and that these would not only be a source of constant distraction but would cause the picture to be lengthened considerably. Because of the cost and other factors, a true sound picture, i. e., one with a sound track attached directly to the film, was out of the question.

Voice Commentary Included

The problem was solved at a nominal cost and with a high degree of success by making a synchronized voice recording of the comments that can be played during the showing of the film. To put this scheme into effect, a script was written which was first tried out by reading it during a showing of the picture. When it had been perfected, a professional narrator was engaged to make the recording. Because of its length, three records are required for the commentary, and to allow time for the changing of these records, the film is divided into three parts, with brief intermissions at the ends of Parts I and II, although all three parts are wound on one reel and it is not necessary to stop the projector at any time during a showing of the film. About 38 minutes is required to show the picture.

The only printed matter in the film is an introductory statement followed by a single sentence pointing to the necessity of doing certain preliminary work on the track in advance of the rail-laying operation. The introductory statement is quoted in part as follows:

"With tracks as the stage and with the assistance of loyal employees as actors, consecutive steps in rail-laying will be presented.

"Hundreds of thousands of dollars are expended yearly for our new rail and fastenings. Great care is exercised in their design and manufacture. Maximum life depends upon how well they are installed and maintained.

"Improved machinery has necessitated changes in our methods and organization. Special emphasis is placed on standardization for finer workmanship and less damage to materials.

"The Committee on Rail-Laying extends thanks to all whose help made this film possible."

Showings of the Film

When the film had been completed a program was undertaken for exhibiting it before groups of interested employees throughout the system. The first official showings were before a group of executives at New York, the System Engineering committee, and a meeting of division engineers. It was then taken to various points on the system for showing before groups of employees who are directly concerned with the laying of rail, such as division engineers, assistant division engineers, track supervisors and their assistants, track foremen, and other maintenance of way personnel. These latter showings were arranged by requesting the ranking maintenance officer of each constituent road of the system to set up a schedule for his particular territory, naming the locations and dates of the proposed meetings and the number of employees that were expected to attend. To date there have been 30 official showings of the film before a total of about 1,300 persons.

The meetings at which the film is shown are usually held in the evening, although a few have been convened in the afternoon. The practice is for members of the committee to operate the projector and afterward to preside over a discussion period. During this period those present are encouraged to ask questions, to state their views regarding the practices shown, and to offer suggestions for improving them. The discussions are conducted in an informal, congenial atmosphere, and the experience has been that, without exception, they have been spirited and constructive. The reception that has been accorded the film wherever shown has been such as to convince the road that the medium employed constitutes an effective method of helping to achieve the desired results. Incidentally, it is recognized that the film by itself does not constitute a complete solution to the problem; rather, it is considered an effective method of supplementing the printed reports and other means of transmitting the recommended practices to those concerned.

All work in connection with the filming and production of this picture was carried out under the general supervision of S. E. Armstrong, engineer maintenance of way—system. The actual work of taking the pictures was performed by David V. Hyde, staff photographer attached to the company's public relations department at New York.

"Golden Spike" Ceremony at the Completion of Guadalcanal Railroad, 1.22 Miles Long, Named The Guadalcanal, Bougainville & Tokyo, Which Was Constructed by the Seabees in Three Days. *Official U.S. Marine Corps Photo*

A Still Critical,

By

A. C. Mann, Vice-President, Purchases and Stores, Illinois Central, Chicago

O. F. Dalstrom, Assistant Chief, Way and Structures Section, Transport Equipment Division, W.P.B., Washington, D. C.

A. L. Sparks, Architect, Missouri-Kansas-Texas, St. Louis, Missouri

E. M. Grime, Engineer Water Service, Northern Pacific, St. Paul, Minn.

A. M. Knowles, Engineer of Structures, Erie, Cleveland, Ohio

General Situation Still Tense

By A. C. Mann,
Vice-President, Purchases and Stores, Illinois Central, Chicago.

ABOUT the first of the present year, the Office of Defense Transportation was named the claimant agency for the transportation industry, which includes not only the railroads but all other forms of transportation. Prior to that time, there was no set regulation, except that the War Production Board would ask the Association of American Railroads what the railroads would need in the way of critical materials over a certain period of time. Following a lot of figuring, some distribution of these materials was then made.

The War Production Board had been experimenting during the last two years with various methods of arriving at a basis for the proper distribution of critical materials, and finally, beginning in the second quarter of this year, it established what is called the Controlled Materials Plan, which is now in effect. We in the railroad industry who have to do with materials feel that this is the best plan that has been proposed thus far. It is working, although we hear rumors that there may be changes in it. We like it because it gives us rather positive assurance that those materials which are allocated to us in a certain quarter will be received during that quarter, or within the early part of the following quarter.

Some of the regulations embodied in the original plan have been eased to the extent that we are now being asked, and, in fact, are being urged, to put orders on the books for steel and other critical materials as far ahead as the third quarter of 1944, on the assumption that by the time we get around to those quarters, allocations will have been made and authority issued to distribute the material ordered. I don't need to tell you that in looking at your needs as far as a year in advance, one must have something better than a crystal ball to gaze into—that he must have considerable leeway in his plans, to the extent that he can make changes as conditions arise. The War Production Board recognizes that, and says it will permit changes in actual orders placed, provided the total tonnage or the dollars and cents quota which has been allotted is not exceeded.

Those in charge of materials started out on the theory that they were going to control the inventories in this country so that vital, critical materials would not be lying around idle—a lot in one place and none in others. We haven't quite succeeded in selling the War Production Board on the fact that a railroad inventory cannot be considered the same as an industrial inventory, although we are coming closer to that all the time. The original plan was to pin us down to a 60-day inventory, and the rule to that effect has not been withdrawn. However, recognizing our position in this matter, the Board is not showing undue concern if our inventory covers 90 day's needs or a little more than that. With regard to bridge timbers, crossties and items of that character, which must be seasoned before treatment, we have succeeded in securing at least a verbal understanding to the effect that a six to eight month's inventory will not be criticized.

The War Production Board is staffed with men who understand, or who are at least learning to understand, the railroads' problem. The men who pass on our quarterly statements have an understanding of what those statements mean, and the importance of materials to the railroads, and while we have not yet gotten the railroad industry, as an industry, out of what is called Civilian Supply, and over into National Defense, where it belongs, we are securing the kind of help from Washington that we have prayed for and worked for.

The transportation industry is about eighth or ninth on the list in the distribution of materials. The

*Presented before the two-day war-time conference of the American Railway Bridge and Building Association in Chicago on October 20-21.

Constantly Changing Problem

Five-part symposium analyzes the situation and points out what track, bridge and building and water service men can do to help*

Army, the Navy, the Air Force, the Maritime Commission, Lend-Lease and rehabilitation bureaus in foreign countries all come ahead of the railroads as regards critical materials, but we are securing understanding consideration on the part of the people in Washington when we present our needs to them properly.

Confusion Clearing Up

Some of the greatest confusion that the railroads have faced in the matter of materials since we entered the war has been due to the fact that they were told from the start that they could have the materials they needed for maintenance, repair and operation, but that before they could make any improvements—make any changes in existing structures that would make them different than before—they would have to secure special authority from Washington—that they could not use materials secured on regular orders for work of that kind. It took a long time for many of us on the railroads to understand that we could not use material in stock for improvements unless we secured a special project authorization from Washington to do so. If the word in this regard has now been passed down by the heads of the engineering, maintenance and purchasing departments, all of whom now understand the situation fully, past confusion in this matter should be eliminated in the future. When we ask Washington for materials, we must be certain that they are used only for the purpose for which they have been requested.

Lumber and Steel

Lumber, in which you men in the bridge and building department are particularly interested, may cause us trouble for some time, although I understand that the timber situation on the West coast has eased up to some extent. In view of this, and with a proper understanding of what their lumber inventory is, I feel that the War Production Board office in Portland will help the railroads get the timber that they need.

The board is not willing for you to build up an unusual supply. There is going to be a tremendous demand in all the lumber-producing territories for boards to be used for crating and blocking in connection with military shipments. So we are going to be up against it for lumber for at least another year, although certain situations may be eased within that period.

There are certain grades of steel that are becoming a little easier. Whether they will stay that way, we do not know. Six months ago, we could not get alloy steels. That situation has eased up considerably and we are now being asked if we can use alloy steel in some places instead of carbon steel, because the latter is vitally needed in the country's shipbuilding program.

These changes occur and we don't know what they are going to be until they happen. A thing that is critical today may be easy tomorrow, and just the opposite. So it behooves those in all departments of the railways to keep in close touch with those on their roads whose responsibility it is to keep abreast of the changing material situation.

Suggestions From W.P.B.

By O. F. Dalstrom

Assistant Chief, Way and Structures Section, Transport Equipment Division, W.P.B. Washington, D. C.

RAILWAY engineers are faced with restrictions in those two materials on which they depend most — structural steel and timber. A third material, cement, is unrestricted and can be had in quantity. Fortunately, reinforcing bars are also obtainable with little difficulty, permitting the substitution of reinforced concrete, where practicable, in projects where steel or timber would ordinarily be used. The restrictions on timber do not apply to piles, so engineers are free to design and build foundations almost to their liking, if they can do so without steel piles.

Lumber is scarce because of increased demand, shortages of manpower and equipment, and other factors. Timber must be used for many projects where speed in construction is a military necessity, such as munitions plants, hangars, military railways, storage buildings, docks, and embarkation and loading piers. On the home front, it is needed for the repair or rebuilding of those timber railway bridges that were carried through the lean years of the Thirties beyond their normal service life, and must now be rebuilt to carry the enormous war traffic. Requirements for boxing and crating for the packaging of equipment and materials for shipment overseas are very large and are increasing, and are one of the chief reasons for the scarcity of lumber. Aircraft and other military items also make heavy demands upon the lumber supply, and housing and farm buildings take considerable quantities of lumber.

Thin Lumber and Steel Critical

The scarcity of thin lumber is acute. The producer saws the log in the way that yields the greatest amount of structural timber, cutting

up the remainder of the log into smaller sizes. This practice will continue so long as there is a shortage of all sizes. It is profitable for the producer. If the time should come when the supply of structural timber equals the demand, while there is still a shortage of thin lumber, then a greater proportion of the log will be sawed into thin lumber. For the maintenance engineer it is fortunate that the shortage of structural timber is less acute than that of thin lumber. The safety of bridges depends on heavy timbers. Thin lumber is needed to repair or to restore buildings, but trains are not endangered if such work has to be deferred. The bridge engineer is hampered by lack of new form lumber, but it is nearly always possible to find substitutes. Used lumber will serve if he can find it, or can make it by sawing old bridge timbers into boards. There are firms doing a large business renting wood and thin-metal forms.

The shortage of carbon steel is also acute. Steel is being used in ever-increasing quantities as production is being stepped up in planes, ships, etc. Steel in some form goes into almost every type of equipment used at the fighting front. On the home front it is recognized that the railroads are a highly essential part of the war machine, and enormous tonnages of steel are going into rails, rolling stock, bridges, docks, car dumpers and engine terminals, to mention only a few of their materials and facilities. Here again the shortage is most acute in one class of product—flat rolled steel. This includes plates and sheets. The plate mills are working to capacity. There are ample facilities for rolling shapes, but there is not enough demand to keep the shape mills running to capacity. There is a good supply of reinforcing bars from re-rolled steel, and there is a disposition to allot all billet steel necessary for tension bars, thereby permitting the construction of concrete slabs for bridges where steel spans would ordinarily be provided. There is not enough carbon steel to go around, so we must contrive to get along with less than we want.

Confronted with these conditions, railroad engineers, supervisors and builders have a wide field for the exercise of originality and ingenuity. Old standards and old ways of doing work need to be re-examined. Tradition goes into the discard. The aim must be to save critical material while keeping structures safe. Cost is a secondary consideration. Build for the immediate future only, if that will conserve critical materials. The distant future will take care of itself.

First of all, every bridge must be made to last as long as it can be made to function safely by making repairs, replacing defective parts and reinforcing weak members. By replacing weak parts, a timber bridge can usually be kept in service a year or two beyond the normal service life as determined by criteria in common use. Steel has the merit of being "good to the last drop." Old steel girders may be weak from wear and corrosion, that is, from reduction of section, but the steel that remains is the same quality as when it was built into the structure. If it had a yield

"Build for the Immediate Future Only, If That Will Conserve Critical Materials."

point of 30,000 lb., what is left has the same strength after 40 or 50 years service. We are not here considering fatigue of metal, which affects only details stressed locally beyond the elastic limit.

Old steel spans that were headed for the scrap pile are being repaired, rejuvenated and put back into service, either on light-traffic lines under small locomotives, or cut down in length and reinforced in details for heavy service. With the highly developed art of arc-welding and the use of the cutting torch, all but the most dilapidated steel spans can be put back into service somewhere, and when that is no longer possible, they can be cut up for material to be used on other spans.

Old steel spans in service can be given the same treatment, and this is common practice. Steel spans designed for E-40 loading have been repaired, and weak parts strengthened, so that they are carrying safely locomotives with axle loads of 72,000 lb. under unrestricted speeds. But it is proper to sound a note of warning at this point. Old spans cannot safely be loaded so far beyond their design capacity until every precaution has been taken to search out and strengthen or replace weak details and to repair defective parts. After this has been done, keep them under continual observation for signs of weakness, and be prepared to follow up with prompt action.

Use Non-Critical Materials

But bridges were not built to last indefinitely, even with the most thorough maintenance. Some bridges must be rebuilt, even in war time. But before deciding on the type for the new bridge, examine the conditions that determined the type of the bridge that is to come out. Conditions may have changed since that bridge was built. A concrete pipe or a short span, for example, may replace a timber trestle or a long span. A short re-alinement of track may reduce or eliminate bridges that were necessary on the original alinement, which may have been selected to avoid heavy earthwork. Where a structure of concrete, plain or reinforced, will serve the purpose, that is the type to build now. A concrete arch may be substituted for a timber trestle. Reinforced concrete slabs on plain concrete piers, or on reinforced concrete pile piers, may be substituted for steel spans. Concrete pipe has long been in good standing among railroad men. Producers of concrete pipe are now offering the railroads a wide range of choice in sizes and designs of such pipes for drainage, cattle passes and small subways. Reinforced concrete piles are ideal for the construction of concrete trestles, and they can be driven in places where wood piles cannot be driven or cannot attain sufficient penetration.

This discussion does not purport to present anything new in construction. Rather, it is intended to emphasize the necessity at the present time of employing every resource that you developed and every device that you contrived during the lean Thirties to conserve materials, improving on them where possible.

Materials for New Construction

In submitting applications on Form WPB-617, keep in mind that the analyst of the War Production Board must know (1) exactly what is wanted, set out in enough detail so that he can determine how you arrived at your total quantities;

and (2) why the improvement is needed now. This latter information is to be given in the answers to the questionnaire. Add extra sheets where there is not sufficient room on the form. Send prints of general plans, but only one print of each. The plans help the analyst to visualize the project and answer many questions that are not foreseen in making up the application or that cannot be covered adequately in a description. Put yourself in the position of the analyst whose recommendations must be fully justified by the evidence accompanying the project when he passes it on for approval and issuance of the final order.

In closing, it is fitting to pay tribute to the engineers in the bridge construction and maintenance departments of the railroads, their supervisors, foremen and the men in their crews throughout our country, who, while struggling with shortages of materials and a scarcity of help, are working with determination, devotion and loyalty to keep the bridges of the railroads safe for the continually increasing burden imposed by the war.

What Building Men Can Do About It

By A. L. Sparks
Architect, M-K-T
St. Louis, Mo.

WE are all anxious to learn of new methods and materials with which we can add to and maintain our over-taxed facilities without resorting to the use of critical materials, or to the use of labor needed for the making of ships and planes and guns. There are many things that we can do in this regard.

First, we can exert every effort to help win the war in the shortest possible time. Second, we can help keep transportation rolling, and at the same time strive to keep the facilities from running down until they are no longer usable, or to the extent that we will not be able to catch up with the burdensome maintenance for many years after the war.

Some Construction Necessary

Some new building construction is necessary. For example, a coaling station, a sand plant, a water service plant or other service building may burn down and, unless replaced, transportation may be crippled. However, in such new construction, non-critical materials should be used so far as possible.

We should familiarize ourselves thoroughly with War Production Board's Conservation Order L41, with all of its revisions and interpretations, and we should also familiarize ourselves with the bulletin on Critical Construction Materials. We should give thorough consideration to our preliminary studies, plans and estimates, being sure there will be no change in our designs and lists of materials that will necessitate resubmitting them to the WPB after authority has been once given.

In recent weeks, much has been said about the shortage of packing cases and cartons in which to ship ammunition and supplies. This need has expanded the demand for wood to include species not heretofore on the restricted list, so that today all lumber is critical and wood of any kind is scarce.

All metal remains highly critical, although there has been some loosening up on small quantities of pipe, reinforcing steel and copper wire, and a general release on nails. This does not mean that we can purchase these things when and where we please, and in as large quantities as we desire, for the demand is still larger than the supply, and probably will be for the duration and sometime thereafter on account of the shortage of labor for producing, processing and distributing them. A certain amount of wood is necessary in almost all kinds of building construction, but there is generally a considerable amount of second-hand lumber available which can be used for building forms and for rough framing. Also, ready-built form units of steel can be rented from contractors in larger cities.

Certain types of structures may be constructed almost entirely with non-critical materials. For example, small shop buildings can be constructed with plain concrete or rubble stone foundations, concrete floors on earth fill, concrete roof slabs on old rail beams, roofs covered with pitch and gravel, walls and partitions of brick or tile, plastered, and the principal windows can be built of hollow glass blocks.

Plumbing, electric lighting, heating and ventilating materials are highly critical, and doors and millwork are somewhat restricted. Therefore, all of these should be used as sparingly as possible.

Much Maintenance Can Be Done

With non-critical materials, much maintenance work can be done *now* to keep structures usable and to avert postponement until our work programs are overcrowded and funds are not available. We can help by catching up on repairs to concrete pavements, retaining walls, masonry foundations and sub-structures, the materials for which are non-critical. We can correct defects in drainage and sewer systems, heretofore crowded out by other construction projects. We can clean and rake the defective mortar joints in terra cotta, stone, brick and masonry buildings; tuck point them and install new wall caps and copings; and calk around the windows and doors—all with non-critical materials.

We can repair and waterproof the weathering surfaces of expensive concrete structures to prolong the life of these structures. We can repair, reline, or rebuild defective chimneys with non-critical materials, and thus reduce the hazard of loss of buildings by fire.

We can substitute plain concrete gutters or walks around buildings for which we cannot secure the material to renew deteriorated metal gutters, and thereby protect the foundations from settlement and the sub-structures from decay. We can renew worn out and leaky roofs with new long life roofs, using non-critical materials, and thereby place those unavoidable expensive repairs behind us for many years to come. We can renew broken glass and repaint buildings and structures. We can clean the rust from some of our corroding steel structures and paint them or coat them with a rust-inhibitive material.

In addition to the strictly maintenance items, we can dismantle obsolete and abandoned structures and reduce the size of stations and other buildings where changed conditions have made such large buildings no longer necessary; and the carefully salvaged material can be used for the construction of new facilities or the repair of old ones. Furthermore,

since house insulation is not critical, we help materially by insulating old buildings to reduce heat loss, and thereby conserve fuel. And in addition to all of this, every bit of dismantled wood should be examined carefully and the usable portions salvaged, even to the shortest pieces which can be used for blocking. Short pieces of timbers can be resawed into boards useful for patching defective sheathing on roofs. Salvaged car lining can be run through planers and made into drop siding. A nail should never be broken off in a board or timber when it can be withdrawn, for it may be necessary, sometime, to rip or plane that board to fill a need where other material is not available.

Water Service Men Can Help

By E. M. Grime
Engineer Water Service,
Northern Pacific
St. Paul, Minn.

WITH the declaration of war, the responsibility of every maintenance of way officer became practically the same as if he were directly in the armed forces, and this is a continuing responsibility. Every water service officer must realize that his minimum requirements today are those necessary to keep the railroad operating at 100 per cent efficiency.

Unfortunately, the labor, material and equipment that are so vital to the provision and maintenance of railway water service must be drawn from the same reservoir as that directly supplying the armed forces, but since this is the case, any water service man who can conserve any or all of these elements, without detriment to good service, is rendering an important contribution to his country at this crucial time. With the demand for the highest quality of locomotive boiler water currently 200 per cent, and sometimes 300 per cent, greater than former normal requirements, conservation does not necessarily mean getting along with less than formerly, but rather that the greater quantities of material required be used more effectively than ever before.

Saving Materials Conserves Labor

A common railway slogan reads "Material is money, save it." Because practically all material or equipment used on a railroad involves the use of labor in its reduction from its natural state, in its manufacture or in its transportation, we may well, with particular timeliness, change this slogan to read "Material is labor, conserve it." In the conservation of material, therefore, labor is of prime importance because it is everywhere a vital element. This does not mean that some change can always be made which will reduce man-hours for a given performance. On the contrary, increased business means that more man-hours will be required, and hence a greater need for careful supervision to obtain maximum production and efficiency. Since the army has already drawn off a large part of our younger available men, we must get the ultimate from what is left if we are to keep performance to the required standard. This may necessitate a much greater use of labor-saving devices and the adoption of minor improvements that have not heretofore been considered essential.

Early in the war, metals became critical, and lumber has since become almost as critical, so that water service improvements of any kind must now be able to justify themselves. Early in the war, water service construction was affected directly by a scarcity of cast iron pipe and fittings, and even of asbestos cement pipe and wood pipe, which in some instances might have been suitable for the same purposes. This situation has been helped greatly on some roads by preparing a list of all piping of various sizes remaining in the ground at abandoned water stations and in abandoned lines elsewhere. Whenever a new improvement is planned, the list is checked over and the required pipe, and often the necessary fittings, are selected for excavation at the most convenient location, preferably on the same operating division. Some railroads have found 10 to 20 miles of cast iron pipe, practically as good as new when cleaned, available as a substitute for such critical material.

Here, of course, there is a labor item involved, but it has usually been found possible to get the work handled by a small contractor whose dragline or trenching machine is idle during the present lull in municipal construction work. In one case, several hundred feet of 12-in. wrought-steel pipe was dragged from an abandoned river intake line and made available for deep-well casing.

The conservation of lumber for new buildings has been possible to a considerable extent by the substitution of concrete blocks, hollow tile or common brick. Small additions required at wayside water treating plants, or for additional chemical storage, can frequently be taken care of by using discarded box-car bodies. This may not add to the beauty of the premises, but it is a legitimate war measure. Creosoted timber for the substructures of water tanks provides a good substitute for the more critical steel, and such timber substructures supporting a wooden tub are economical substitutes for complete steel storage tanks.

Cleaning Pipe Lines

The cleaning of certain existing pipe lines, where a higher pumping pressure is required than should normally exist, is another important item in the conservation of water service materials. One pipe line, two miles long, cleaned without serious interruption to pumping service, increased the capacity of the line from 233 to 341 g.p.m., or 46 per cent. As a result, it was possible to provide ample pumping capacity and also to get along with two pumping shifts where three would have been required otherwise. In another case, cleaning the tuberculation from an old discharge line only 1,100 ft. long, decreased the total dynamic head sufficiently to increase the pumping rate by 55 per cent. This made it unnecessary to purchase a larger capacity pump, which had been contemplated. These and other examples of measures which have accomplished savings in a similar way, show the desirability of investigating pumping pressures and capacities, particularly at places where the water demand has increased to such an extent that larger service lines and larger pumps are contemplated. By these measures, the purchase of critical materials may often be postponed or avoided, with no resultant loss in service.

As the result of increased business and the necessity for moving it faster, increased flow at water col-

ums is one of the urgent requirements at many places. In some cases, the laying of a larger supply main is the remedy, while in others, the rebuilding of the storage tank at a higher elevation gives the desired additional flow head. If the larger size of pipe is not available, sometimes the laying of an additional pipe parallel with the existing main, in some size that is available, will give the desired increase in delivery.

Pumps for Motors

In many cases, modernization of existing pumping equipment now becomes of paramount importance, even though critical materials must be made use of, because it is the only practical way to obtain the necessary increased water production. In some cases, it will be found that by replacing an obsolete type of triplex or duplex pump with a centrifugal pump of larger capacity, less weight of critical steel may be required than for the necessary repair parts for the old equipment. The expense may also be less and the efficiency of the operation improved.

Electric motors are now so critical that an inventory should be made of all surplus equipment of this kind on the railroad. Sizes may often be found that can be used to advantage to replace gasoline or fuel-oil engines which have reached the stage where repair parts, even if available, are not justified economically. With electric power, it may also be possible to arrange for automatic operation and thus make a saving in labor.

It is now of greater importance than ever to make certain that there shall be no delay to traffic in any way chargeable to failure of water-service equipment, and supervisory officers, although already making every effort to avoid waste or unnecessary use of critical material, have a greater responsibility than ever before to make certain that all water service equipment is being scrutinized carefully to anticipate failure of essential parts and to have repairs arranged for well in advance, so that there will be no stoppage of water production. Even the conservation of critical material is secondary to keeping each piece of vital equipment operating at its highest efficiency, and of constant inspection and maintenance so that it will continue to so operate.

As Seen By a Bridge Man

By A. M. Knowles

Engineer of Structures, Erie, Cleveland, Ohio

DURING the last two years, bridge and building officers have learned much about federal control and regulation in the distribution of materials, and what they mean in the maintenance and construction of the railway facilities. We have become accustomed to priorities and preference ratings and their consequences. The shortage of labor, which is growing more acute daily, on top of the federal restrictions that are being imposed on the material supply, is forcing the greatest economy of both labor and materials at a time when the railroads are better able financially to expand their expenditures for needed improvements than ever before.

The absorption of enormous quantities of materials of every class in the war effort, together with the cream of the manpower of the country, has forced every bridge and building man to exercise extraordinary vigilance and to develop an added sense of responsibility to see that neither material nor labor is wasted, but rather is utilized to the fullest extent. At the same time, it is self-evident that the facilities under the care of bridge and building men represent the foundation upon which the entire railroad plant rests. Any failure in these facilities will result in delay, loss, and sometimes disaster, and to that extent will hinder the important part the railroads are playing in the war effort.

Use On-Hand Materials

It is of no avail to wish for materials or men which we cannot have. We must make the most of what we have and exercise all the ingenuity, resourcefulness and courage we can muster to this end, and also encourage these qualities in others all the way down the line, to enable us to cope with the situation and attain the essential results. The conservation and fullest utilization of materials on hand is one of the first steps in attaining these essential results. If the required materials are not already on hand and cannot be procured from other departments, satisfactory used materials may frequently be purchased without priority assistance. While it might not be considered economical under ordinary conditions to work over and reuse secondhand materials, as a war measure it is quite the thing to do, regardless of the economy phase. Frequently, as much economy and as satisfactory results are secured from such usage as would be the case if all new materials were used.

On the Erie we have made use of entire second-hand girder spans that had been released previously for various reasons—spans that, as constructed originally, were too light for present-day power. This has been done either by reducing their length or by reinforcing their parts. For some of the reinforcing for such spans, second-hand material can be used, but in other instances new material is necessary. Many steel bridge repairs can also be made with second-hand material. Besides reworking released bridges for reuse, we have, while making repairs to existing bridges, reinforced many of them in service. New material is usually necessary for such work. We have found considerable advantage in the use of second-hand beams for grillages in bridge seats, to prolong the life of old abutments that were beginning to fail under the bearings. The beams used in these cases are long enough to distribute the girder or truss loads over a larger area of the abutment than the original bridge bearings, which were designed for lighter locomotives than those now in use.

Bridge and building officers have always foreseen their needs for materials and supplies well in advance of their usage, but because of the present shortages in many items, major operations, at least, must be foreseen even earlier than heretofore. This is necessary to avoid risks of delays or of being prevented from undertaking work entirely because of failure to have on hand the necessary materials and equipment.

Train New Employees

The effect of the shortage of experienced maintenance forces is next in importance to the shortage of materials and equipment. With the constant drain of experienced men to the armed forces and war industries, resort must be made to filling in our forces with new recruits who must be trained for the particular work they are expected to do. Many of these new recruits are unaccustomed to the inconveniences

and hardships they must undergo, and it is more difficult to retain them in the service than it has been to hold the men of an earlier generation, who began their railroad careers when there were an ample supply of labor and fewer attractions in other kinds of work.

As a consequence, camp cars or other facilities housing bridge and building crews located away from their homes for weeks at a time should be provided with better living conditions and greater conveniences than in the past to make them more attractive to the class of men now available for this type of work. This has been done to a large extent on the Erie, and more improvements of this nature are under way.

The Erie management, realizing the need for and the advantages inherent in systematic training of its new employees, and of improving the status of older employees under present circumstances, as well as the need for a definite technique to be followed in providing such training by key men or supervisors, has established an educational department under a director who devotes his entire time to carrying out a continuous training program. This applies to all departments of the railroad, including the bridge and building department.

The director, taking small groups of the heads of departments and their assistants at a time, gives them the necessary instruction and training to enable them, in turn, to become instructors of groups under their jurisdiction. They are taught the principles of salesmanship, job-instructor and job-method training, how to encourage and maintain enthusiasm, and how to settle grievances.

The job-instructor-training course is designed to teach the best way to get a man to do a job safely, correctly, quickly and conscientiously. This has been very helpful in getting across to supervisors and foremen the fundamental principles and methods of training men. The job-methods-training course, on the other hand, is designed to give one a practical, organized plan to improve job methods, to produce more and better products or services in a given time, with no harder work, and to make the best use of machines, materials and the abilities of those people now available. This course has stimulated the heads of departments, supervisors and foremen to study many phases of work under their supervision and to suggest improvements, with the result that many new ideas are being adopted and put into use.

Railway Battalions Serve Around the World

(Continued from page 956)

The trusses and trestles are sectional and flexible as to lengths within certain limits. They are all bolted and so designed that additional sections may be added.

Necessarily, in the field, one resorts to every kind of makeshift. The accompanying illustrations, which show damage to bridges and the methods of repair, will be of interest. In some cases, sectional spans have been used; in others, a span has been filled in with earth; and in still others, the bridge has been bypassed with a piece of track.

One of the complications connected with such repairs is that the locations may be mined. The wreckage makes a splendid place for booby traps. When you start to clear it away, you find an innocent looking piece of timber or steel hooked up to set off a mine.

Theoretically, the rehabilitation of the railroads is a function of the Corps of Engineers who turn over the repaired railroad to the Transportation Corps for operation. Actually to date, most of such repairs are done by the track and maintenance companies of the railway battalions.

Also in North Africa

The number one railroad man in North Africa is Brig. Gen. Carl R. Gray, in civilian life executive vice-president of the Omaha. Some of the higher ranking officers with him are Lt. Col. Fred W. Okie, division superintendent from the Southern; Lt. Col. J. J. Daugherty, master mechanic of the Southern Pacific; Lt. Col. Charles D. Notgrass of the Santa Fe; Lt. Col. R. J. Crane of the New York Central, handling bridges; and Lt. Col. B. H. Decker of the Denver Rio Grande & Western. So it goes through a long list of officers, well known in shops, offices and on the roads in this country.

Trains under military control in North Africa run from the Atlantic ocean across the continent to beaches at Tunis. They carry troops, Arab labor battalions and, separately, goods for civilian consumption. This tonnage rolls in a variety of equipment, ranging from the old World-War type of "40 hommes, 8 chevaux" box cars, to modern steel gondolas brought from the United States. The main line following the coats is standard gage. The branches that go off to the south are 1-meter and 1.05-meter gages. The locomotives range in type from electric and Diesel-electric to steam, and in vintage from 1899 to just before the war. American locomotives are brought in in crates and assembled in the shops at the ports.

Railroading here is an international melange of United States, British, and French military personnel, French civilians and Arabs, with troops handling entirely movements near the front. Obviously, it is rich in anecdote. I am quoting from a report of one engineer's experience to give you some idea of the difficulties of train operation:

"I am taking this rattler along about 45 miles an hour when we start down a two per cent grade. Further along we pick up ten miles an hour. I think that'll be enough, so I whistle once for brakes. Over here we have no air. We have Arab brakemen scattered along the train with hand brakes. One whistle means brakes—most of the time, not always. This time all the brakemen were asleep.

"By and by, this choo-choo is rolling along at 65 miles an hour. My fireman is sitting on the French engineer to keep him away from the throttle. He wants to reverse the thing. You can do that on a French engine, but on this Yankee engine, it would strip the valve gears.

"You're supposed to stop at every station to get clearance for the next —not my train, for we went through four stations, and the chefs de gare were all out waving at us and hollering like hell for us to stop. Back in the caboose, I learned later, the lieutenant had the French conductor down in a corner and was sitting on him to keep him from jumping. Finally, we hit an up-grade and slowed down. So we went back and slapped the Arabs awake and went on, away ahead of schedule."

Sleeping Arab brakemen are the least of the hazards of the road. Further forward along the fighting front, the operating forces are exposed to many dangers, including mined tracks, strafing and dive bombing from the air, and action by enemy patrols. Mined tracks were considered more of a nuisance than a hazard. After each new piece of roadway was taken from the enemy, a track-walker trained in mine detection, traversed the line. Later, when the first train rolled, it pushed three empty flat cars ahead of it. If an undetected mine had remained, a car would have been damaged, but a precious locomotive would have been saved. A few locomotives have had to undergo repairs from damage caused by strafing in the earlier phases of the Tunisian campaign, but as enemy air-power diminished, trains ran unmolested to the front.

In this campaign Lt. Col. Okie was decorated, as were a number of others, for various exploits. His decoration reads in part:

"Lt. Col. Okie organized and led a detachment of his battalion beyond our own lines to the vicinity of Moulares, Tunisia, to attempt to bring out two trains of ammunition, which had been abandoned after a rapid enemy advance. When enemy forces closed in and made movement of the trains into our lines impossible, he supervised the destruction of the locomotives, assembled his detachment and a number of civilian refugees, and led them all to safety by a circuitous route through the desert to Tebessa."

Working to the last minute, the Colonel barely got out of one town as German tanks entered from the opposite side. Racing along in two trucks, loaded with his crew, he was fired on point blank by an anti-tank gun, but managed to get into mountainous country, where he drove up the bank of a dry river bed, escaped with his convoy and disappeared.

Lieutenant Colonel Okie's battalion was again cited by General Patton in Sicily. It landed an advance reconnaissance party at Licata, reconnoitered the rail yards, organized the civilian rail workers, located equipment, got up steam on a locomotive and made a pioneer run over part of the road, all within four hours from the time they hit the beaches.

Twenty hours later, full trains laden with vital supplies were running into the Third division's forward positions, thereby releasing divisional truck transport for battle duties. The reconnaissance party was led by Maj. C. O. Butler (A. C. L.) and Capt. Marvin L. Horton (A. C. L.), both of whom received the soldier's medal.

Despite a nightmare of mines, strafing, sabotage and other retarding influences, the opening of the rail lines and reorganization of the Italian railroad personnel was made so rapidly that rail service was available into Palermo on July 28, when the port was opened.

We have as yet no detailed information on railway operations on the mainland. I did see a dispatch which said that the engineers, under Maj. Arthur G. Teets, were now operating out of Naples. Major Teets (N. Y. C.) is executive officer with a military railway battalion.

We have gone a long way around the world, but I think this gives, without too much detail, a fairly comprehensive picture of what your associates are doing in the far corners of the earth.

The Manpower Problem

(Continued from page 953)

is proud of it. If he thinks the women are becoming too tired, he tells them to sit down and rest, but if he thinks they are loafing, he gets tough and tells them so. When we established the gang, he was one of few who believed that it could succeed, and he has made it a success.

The gang is composed of the foreman, an assistant foreman and 25 women track laborers. Twenty women are about the most that ever report for work on any one day. At present, there is also a man truck driver in the gang as the gang is raising a passing siding 35 miles from its headquarters. The principal job of the assistant foreman and the truck driver is spiking ties; the remainder of the time they help put in ties. The women do everything else, including the handling of the jacks. During an average eight-hour working day, they raise fifteen 33-ft. rails and put in 40 side-track ties. They have been doing this work steadily since last spring, and in six and one-half months they have raised seven and one-half miles of passing sidings and one mile of yard track, and have installed 3,000 ties. In addition, they have leveled the stone ballast on eight miles of track.

Need Special Training

We have tried to educate the women to know what they are doing, and why. I asked three of them one day why they were raising track, and they didn't have any idea. When the foreman started telling them what they were doing and why they were doing it, both the quality and the quantity of the work improved almost at once.

There were four personal injuries in the gang during the first five months of its existence. The first occurred when two women were lifting 200-lb. kegs of spikes over the side of a gondola, instead of rolling them on a plank. One of them strained her back when lifting the fourth keg. The other injuries were cut and bruised fingers while handling material. Since May, however, no one has been hurt. Apparently it took that long to convince some of them of the real importance of safety rules, and for them to become accustomed to their new work.

On our St. Louis division, we have employed women in the bridge and building department as painters, with some success. The principal trouble has been that there have not been enough of them to warrant putting a foreman in charge of them.

A good gang of women who really want to work can probably do about two-thirds of the jobs that the same number of men will do, though not so fast or so skillfully. They can paint, weld, cut, adze and use an axe, saw, hammer or plane. They can dig, shovel sand and gravel, and push a wheel barrow if it is not too heavy. Jobs they cannot do include heavy lifting, spiking, heavy riveting and those classes of carpentry, steelwork and masonry work which require years of training and practice.

We now have approximately 21,500 women working on the Pennsylvania. Many are in our car and machine shops. Others truck freight, drive trucks, wash engines, clean cars and handle mail. There are also a few in train service around Philadelphia. It is no longer a case of whether women can help in railroad work, but rather one of being able to get them to work, for in our part of the country they are becoming almost as scarce as men.

Summarizing the experiences of the last year, the following principles relative to the employment of women can be laid down: (1) So far as possible, women should be kept in gangs separate from men; (2) Give them a good foreman who believes they can succeed; (3) Don't pamper them; (4) Educate them and tell them why the particular work is being performed; and (5) make them realize that they are helping to win the war.

Extra Gang of Women Renewing Ties and Surfacing a Siding on the Pennsylvania at Larwill, Ind.

What's the ANSWER?

Maintaining Power Machines

What type of organization is desirable for field maintenance of power machines and tools? What are a field mechanic's functions? To whom should he report?

Good Operation Essential

By C. R. KNOWLES
Superintendent of Water Service (Retired)
Illinois Central, Chicago

Qualified, well-trained operators should be considered essential adjuncts to any field organization for maintaining power machines and tools. It should not be taken for granted that a power machine or a power tool requires constant attention on the part of a regular field maintainer to keep it in good operating condition. Most of the power machines now in service are the result of years of careful study and experiment on the part of manufacturers and the weak points have been largely eliminated. There are many examples of long uninterrupted service from these machines where they have been handled by competent operators. In contrast, the same machines have given almost constant trouble in the hands of careless or incompetent operators. Obviously, failures and breakdowns will occur, even with the most careful operation and field maintenance, but a large percentage of the failures that do occur, perhaps as many as 50 per cent, can be avoided if the machine or tool is given adequate care in its operation.

Even the best operators cannot be expected to take care of all field maintenance, as there will be occasions where the services of a skilled mechanic will be required to handle repairs of a more complicated nature than ordinary running repairs. On the other hand, good operation means more than merely starting and stopping the machine and manipulating certain levers, wheels or other controls. It includes correct lubrication, adjustment of moving parts, packing and the replacement of minor parts.

It is advisable to have a traveling or field maintainer on each division, and, in some instances, on each district, to make repairs that are beyond the ability of the operator. Of equal importance, he should instruct and advise the operators in the care and handling of their machines. The territory to be covered by the field maintainer should be determined by the number of machines in service and their location, rather than by mileage. In some instances it may be advantageous to provide field maintainers with light highway trucks to enable them to carry tools and repair parts that will greatly facilitate their work in the field. This is done successfully on some eastern roads in territory where rail traffic is heavy.

One important defect of both shop and field maintenance, especially the latter, is failure to keep accurate records of tool and machine performance and failures. Adequate records and reports are essential to the success of any field maintenance organization, as they provide a check on both the efficiency of the machines and their operators. This does not entail any great expense for clerical work, as it can usually be handled by the regular force. Such records will invariably give good returns in better performance and lower maintenance costs, since they provide a check upon the comparative operating costs and the work done by the various machines.

The functions of a field mechanic or maintainer have been referred to in the preceding comments, but they can be summed up briefly as follows:

Send your answers to any of the questions to the What's the Answer Editor. He will welcome also any questions you wish to have discussed.

To Be Answered in February

1. *In view of the present difficulty in obtaining repair parts, to what extent should a stock of parts and other supplies for motor cars now be carried on hand? Who should carry them?*
2. *What practical means can be employed to hold bridge and building men in the face of constant industrial demands for skilled labor?*
3. *What measures should be taken to keep camp cars for floating gangs in good condition? Permanent labor camps? What effect will this have on attracting or holding men? Why?*
4. *Where heavy ice jams at a bridge, what measures can be taken to break the jam? If the ice is ground up? What precautions must be observed?*
5. *When raising track out of face, how many jacks should be used? Why? Will this reduce or increase the probability of delays to trains? Does the height of the lift or the density of traffic make any difference?*
6. *What measures can be taken to prolong the life of rubber and composition pump valves?*
7. *What special attention should be given during the winter to rail that has been laid early in the winter? During the spring?*
8. *To what extent can glass blocks be substituted for critical materials in building construction and maintenance? For what purposes? What are the advantages; Disadvantages?*

(1) the field maintainer should make inspections of all power machines and tools under his jurisdiction as often as his duties will permit, making such repairs and adjustments as he finds necessary; (2) he should instruct the operator of each machine as to its operation and care; (3) he should foresee the need for repairs and obtain the repair parts in ample time; (4) he should determine when the machine should be sent to the shop for repairs and overhauling, giving in detail the repairs that are needed. The field maintainer should report to and receive his instructions from the foreman of the maintenance shop.

Should Be Competent

By District Engineer

To begin with, there should be a shop superintendent or foreman in charge of the shop to which the power machines and tools are sent for general repairs, who should be held responsible for the condition of the equipment, regardless of whether this shop is under the general jurisdiction of the engineering or the mechanical department. The field maintainer should report to and receive his instructions from the shop foreman, so far as the inspection and care of the machines are concerned, but if the shop is a mechanical department facility, he should also be under the direction of the supervisor of work equipment, so far as his schedules and his relations with the operators are concerned. One important consideration should be that he is not given more machines and tools to look after than he can handle successfully.

The principal function of the field maintainer is just what his name indicates—to maintain the machines and tools in good operating condition, so repairs will be kept to the minimum during the working season. Another function, important at all times but especially so at this time, is that of instructing and overseeing operators in the handling of the machines, for to a very large extent, careful and competent operation will eliminate the necessity for repairs.

Wood Instead of Iron Doors

To what extent is it feasible to substitute wood for metal doors? What precautions should be observed?

Use to Best Advantage

By A. L. Sparks

Architect, Missouri-Kansas-Texas, St. Louis, Mo.

In these days of restrictions on the procurement of materials, many things can be and are being done, that would not be done, at least to the same extent, in normal times. For this reason, the extent to which we may go in substituting wood for metal doors will depend largely on the price we are willing to pay, what concessions are permissible and whether we can accept the penalty.

Generally, although not always, metal doors are used as a fire-resisting measure, to comply with local ordinances or to meet the requirements of the National Board of Fire Underwriters. They are frequently used, however, because of their superior strength and resistance to wear or for ornamental purposes. In the latter event, wood may be substituted for steel, if it is desirable, without exercising any special precautions.

There are several types of approved fire doors, and some that are not approved. Those bearing Underwriters labels A, B, C, D, E and F, are each constructed for a particular service or to withstand certain temperatures for a varying number of hours of continuous application. When substitutions are made, they should be designed to accomplish, so far as possible, the same results as the doors bearing the underwriters labels.

One of the most effective large barriers to fire is the theatre curtain; the most effective weather stop for large openings is the overhead type of door which clamps tightly into place, while the door that offers the greatest resistance to intrusion is the steel door on the vault. It is obvious that these doors are not interchangeable or capable of being used as substitutes for the others, but in the general run of doors, substitutions can be made and are sometimes justifiable.

Temporary fire doors, having wood cores covered with rigid asbestos cement sheets, may be substituted in some cases for metal-clad wood doors. Where substitutions are made, even with the approval of the local building commissioners, precautionary measures should be taken to invite inspection by the underwriters, who may or may not penalize the insurance contract, but who will provide whatever evidence may be necessary to show that any additional risk is covered. Sometimes underwriters recognize even a wooden door in a fire wall as a draft barrier, but not a fire stop.

Where wood or other unapproved construction is used, the installation should be designed with a view to changing it so as to comply with necessary requirements when conditions again become favorable. Some city building inspectors have been lenient enough to grant emergency concessions, but, since the laws were enacted for our own protection, we should endeavor to keep the standard as high as conditions will permit.

Lumber and metals are both critical at present, and both should be used to best advantage, but since it will probably be necessary to file application for federal authority for any new construction, it seems advisable to use doors that suit the purpose rather than resort to any type of substitute.

Depends on Use

By General Inspector of Buildings

I do not know of any cases where a wood door cannot be substituted for a metal one, except for vaults and similar barriers, or for imposing entrances where appearance is paramount, and where a wood door would be entirely out of keeping with the design.

There are, however, a multitude of applications for which the wood door is far more suitable than one of metal. Even in fire walls, built up (that is, made of several plies) wood doors having sheet-metal exteriors, are preferable to all-metal doors because they do not warp under the continued application of heat. With the advance that has been made recently in the treatment of wood to resist burning, this type of door is still more suitable than formerly for this purpose.

Wood doors can be substituted for metal doors for the exterior openings for shops, particularly where the fire hazard is small, but even here a fire-resistant treatment will greatly improve their comparative value. They are generally preferable for the large openings because they are more easily repaired in case of damage and can thus be replaced more quickly. They can also be substituted at the entrance openings to enginehouses, although I prefer the metal door for this application.

There are so many kinds of doors

and they are used for so many purposes and under such a variety of conditions that it is impossible to enumerate them in detail. Yet, with the exceptions already noted, that is, where strong barriers are necessary or appearance must be maintained as long as practicable, wood doors can be substituted for metal doors, although this is not always desirable, with little detriment to the purposes for which they are intended. However, where there is any appreciable fire hazard, they should be given an approved fire-resistant treatment and, because of the effect such a substitution may have on the collection of insurance, the fire underwriters should be consulted before the application is made.

Shimming for Heaving Track

What precautions should be observed in the application of shims to heaving track? Should shimming be done under flag protection? Why?

Use Level and Gage

By D. T. Faries
Track Supervisor, Bessemer & Lake Erie, Greenville, Pa.

When it becomes necessary to apply shims to heaved track to bring the rails to cross level, it becomes important that the work be checked thoroughly by constant use of the track level and track gage. Too often, foremen rely on the eye alone when performing surfacing work of this nature, as well as in ordinary tamping operations. The use of the level and gage will insure that the track will be in the best shape possible under the conditions that always surround heaving. Care must also be exercised to insure that the track is in good line where the shims are placed, since line kinks will cause lateral thrusts that will tend to widen gage, because the holding power of the spikes and tie plates is greatly reduced when the track is shimmed.

When applying shims, the spikes should never be pulled only half way out of the ties, to permit the tie plates to be lifted and the shim slipped between the tie plate and the rail, for this only loosens the spike in the tie. Neither should the shim be slipped between the tie plate and the rail. Spikes should always be removed, the spike holes should be plugged, and the ties adzed, if this is found necessary, and coated with creosote. The shim should then be applied, the tie plate replaced and the rail spiked.

Where shims are more than ½ in. thick, rail braces should be applied on the outside of the rail and, in addition, spikes 7 or 8 in. long should be employed, depending on the thickness of the shims. It is not permissible to use tie plates as shims, and all shims should be made in the shop, where they can be cut to size and prebored for spike holes. After the rails have been gaged and leveled, suitable run-offs should be provided in each direction from the high point of the heaved spot. This can be accomplished by the use of ¼-in. shims and the removal of tie plates. Tie plates should be replaced on all shims, except on the runoff, and in no case should tie plates be removed where it is possible to retain them.

Shimmed track should be inspected frequently, and a close check should be made of level and gage, as well as of the condition of the shims and fastenings after any protracted spell of warm weather which might thaw the track. In the spring all shims should be removed as soon as the frost leaves the ground and as the heaved spots begin to settle. The track should then be put in good line and surface and the shims recovered for use the following winter.

Keep Rail Upright

By Division Engineer

No other features of shimming track are more important than line, level and gage. The rail is not supported as rigidly on shims as by the ties, and the fastenings are not as dependable, because they must hold together an assembly consisting of rail, tie plate, shim and tie. The next most important feature is the preparation of the bearing surface for the shim, for the shim must set level to insure that the rail will be upright.

Special shimming spikes, longer than normal track spikes, should be used, the length depending on the thickness of the shim. The rail should be well braced with specially-designed wood braces, even where the shimming is light. As the thickness of the shims increases, their length should increase correspondingly, and they should be held down by independent fastenings. When the thickness becomes greater than 3 in., the shims should extend through under both rails, using 3 or 4 in. plank, and be spiked to the ties. Further shimming can then be done on top of the plank.

Whether the shimming should be done under flag protection will depend on whether it can be done safely without, or whether the track will be unsafe for full speed while the work is in progress.

How to Prevent Freezing

What measures should be taken at this time to prevent water-service facilities from freezing? Who should do this?

Requires Foresight

By C. R. Knowles
Superintendent Water Service (Retired) Illinois Central, Chicago

Well-designed and well-maintained facilities require little preparation for winter, except where long periods of very low temperatures prevail. A prolonged period of temperatures in the lower twenties is worse than a short period well below zero, particularly where surface supplies are drawn on. Pump houses should have storm windows and be kept closed when no attendant is on duty; in extremely cold climates they should have double doors. Heating equipment, including stoves, radiators, steam piping, steam traps, and pipe insulation should be put in the best possible condition to prevent failure or loss of heat.

Frost boxes under tanks and on pipe lines should be placed in good condition, and that portion of the tank frost box extending below the frost line should be cleaned and kept free of water to take all possible ad-

vantage of the radiation of the earth. Precautions should be taken to insure that the frost box is waterproof, as it will have no insulating value if water soaked. Leaking valves should be repaired and valve boxes made frost proof, for a frozen valve may mean a frozen pipe line.

Outlet valves on tanks should be inspected and worn valve seats repaired or renewed to guard against freezing or the formation of ice on the outlet pipe or goose neck. Water column valves should likewise be put in order and drains opened. The pits should be insulated, and the side walls should be protected with timber lagging to below the frost line. Short open drains should be trapped to prevent the entrance of cold air. If current is available, an electric light bulb or strip heater will prevent freezing, or a kerosene lamp can be used where current is not available. Tank roofs should be repaired and made tight to exclude air and the tank should be kept filled with water as less ice will accumulate.

Drainage from hydrants should be opened if clogged, and hog showers should be disconnected. Frequent inspection should be made of fire hydrants to insure their operation in case of fire.

The protection of water-service facilities is primarily the responsibility of the supervisor or foreman, but this responsibility is shared by the district and other repairmen as well as by the pumper or other water-station attendant.

A Housekeeping Job

By E. M. Grime
Engineer of Water Service, Northern Pacific, St. Paul, Minn.

Railroading is more or less of a housekeeping job, and the measures to be taken at this time of year on any well-maintained property to prevent freezing difficulties during the coming winter, consist of various small details with which every supervisor of bridges and buildings, or of water service, should be more familiar than any other officer on the railway. He alone knows the particular water columns that have given trouble in the past and has prepared wisely by ordering and replacing defective gaskets, by correcting valve leakage, by repairing operating levers, or by going over other details that have given trouble during cold weather.

If the drain to a water column is short and open to the air, some special precaution may be necessary to keep cold air from driving into the pit. Frost decking inside the pit may need repairs. In extreme cases, additional protection over the column deck may be desirable, which can be provided by placing a cover of about 18 in. of stable manure. Plenty of oil or grease on working parts may ease operation and prevent breakage. At terminals where steam is available, a lot of satisfaction can be obtained by providing small steam coils in water-column pits; and, at some outlying points, a large size barn lantern or oil heater in the pit may be desirable. Ventilation must not be overlooked, however, for even a small flame will not survive for many hours if it is deprived of sufficient oxygen.

Storage tanks, especially at outlying points where water is taken infrequently, may need special attention to insure that there is no possibility of freezing in the frost chamber. As a rule, disturbance of the water once or twice in a 24-hour period, by requiring certain trains to take at least a small amount of water, whether they need it or not, will usually prevent serious freezing. There is always a chance, however, especially on branch lines, of having service tied up for a few days by storms. A large lantern or a small oil heater in the frost chamber may be desirable in some locations.

Attention should be given to having the frost chamber tight, particularly where it connects to the underside of the tank, so that such heat as may be available will not be dissipated by leakage. This refers particularly to wooden tank structures, but steel-tank water legs may also need outer protection in about the same manner as frost chambers, by providing dead air spaces, with or without heat.

In cold climates, ice will accumulate gradually to a thickness of about 3 ft., completely filling the water leg if no circulation or heat is provided. This is most likely to occur where the water is taken from a reservoir or stream in which the temperature of the water is at or just above freezing. Where the water comes from a deep well and the temperature is constantly above 50 deg., the conditions are much more favorable.

It is impracticable to mention all of the details that must be watched, but the water supply is so important to the normal operation of the railway that keeping all of the details of repairs constantly in mind and caring for them during warm weather is a policy that will save many "headaches" during severe winter weather.

It is important to keep in mind that priorities make it increasingly difficult to obtain even some standard repair parts, and that shipments are delayed correspondingly. It should be the policy, therefore, to anticipate the failure of vital machinery much farther in advance than formerly and have extra parts on hand for those emergencies that are bound to occur, such as the knocking down of a water column, damage to a water spout or other equipment, which happen on even the best-organized railways.

Single Spans for Stringers

In view of the present difficulty of obtaining structural timbers, is there any objection to using stringers of single-span length for open-deck trestles? Why? Are there any advantages?

Increases Butt Joints

By A. B. Chapman
Bridge Engineer, Chicago, Milwaukee, St. Paul & Pacific, Chicago

Stringers of two-span lengths provide some continuity over supports, which reduces the stresses in the stringers, particularly when both spans are loaded. Stringers that are continuous over the cap also have a better bearing than those where the ends of two stringers are butted over the middle of the cap. This road tries to reduce the number of butt joints over the cap to the minimum, as decay usually begins at the ends of untreated stringers, and their effectiveness in bearing is thereby reduced.

Some roads lap the ends of stringers to get full bearing for each stringer on the cap. If single-span stringers are used, this not only requires additional timber, but results in an impractical stringer spacing, which is necessary to place 12 to 16 stringers side by side on the cap. Under such an arrangement, the stringers do not receive equal loads, and there is not the same continuity of structure as with butted joints.

If one bent under a series of spans is weakened by stream action, ice, decay or other causes, the continuous deck will relieve the weakened bent of part of its load. In an extreme emergency a light train might be car-

ried over a failed bent having partially continuous stringers and there have been just such cases. On the other hand, if each span were separate, complete failure would occur. The continuity of stringers might also prevent the failure of a single bent, which might be affected by unusual lateral forces, since part of the force would be transferred to adjacent bents.

Where the continuity of a trestle is interrupted by a draw-span opening, or by support at one end on a masonry pier where no effective anchorage is provided, a series of single-span stringers will tend to pull apart, unless specially spliced, whereas, with a continuous chord, this action is prevented effectively.

In some localities stringers of one-span length can be obtained more readily than those of two-span length. Furthermore, on very sharp curves, stringers of one-span length can be fitted to the curvature of the track more easily than two-span stringers.

Are Easier to Obtain

By H. T. Livingston
Engineer of Bridges, Chicago, Rock Island & Pacific, Chicago

One of our divisions has constructed several trestles with single-span stringers, from plans prepared in this office. Division Engineer H. M. Long and Master Carpenter J. S. Langston, who erected these structures, have had many years experience in the construction and maintenance of timber trestles, and when your question came to my notice, I asked them for their comments. They replied that they were led to use this plan (1) because there is a saving in the cost of the short stringers, compared with those of two-span length; and (2) quicker delivery of the stringers could be obtained.

At present, the cost of the short, creosoted, southern pine stringers is approximately $20 less per M ft. b.m. than that of the long stringers. However, the differential was less in 1938 when the plan for the trestles was prepared. The difference in cost at the mill for the single and double-span lengths for stringer of Douglas fir is so small that the use of the shorter stringers effects little or no material saving. Earlier delivery of the short stringers could be obtained in the southern territory because there are a large number of mills from which they can be purchased and a great many small trees from which they can be cut.

However, in the light of the greatly increased cost of construction and maintenance of trestles built with short stringers, as indicated by Messrs. Long and Langston, the material saving is not of paramount consequence. It is quite possible, although we abandoned the use of short stringers shortly after the structures in question were erected, that we may be compelled to resort to their use again in the near future. However, we shall continue to use stringers of two-span length as long as possible.

Has Two Sides

By General Inspector of Bridges

Obviously, stringers spanning two panels have all of the advantages of continuous beams, so far as resistance to bending and reduction of stresses are concerned. They also add somewhat to the longitudinal stiffness of a trestle and tend to keep the track in better line than single-span chords. Furthermore, there is added safety in case a bent settles, has been partially burned or has been weakened by scour. Against this, however, the occasions on which a continuous chord will be of advantage in such cases, are so rare as to make this feature almost negligible; in fact, no such case has ever come under my direct observation. I have seen trestles fail from a variety of causes, but not a single failure that I can recall would have been prevented by continuous chords, or the hazards to trains lessened.

One of the real advantages of the shorter stringers is the difference in weight, which makes them much easier to handle, even with hoisting equipment. An 8-in. by 16-in. by 14-ft. stringer weighs approximately 600 lb., while a 28-ft. timber of the same dimensions weighs about double this amount. If the panels are 12 ft., the ratio will be the same, although the total weights will be less. They can, therefore, be handled by a smaller number of men, particularly if they must be handled by hand, as generally occurs in maintenance. When a stringer or chord must be renewed, only a single panel of the bridge is involved, against two, or three, for the continuous chords.

Under normal conditions, there has been a considerable differential in cost between the long and short stringers, while, for the reasons given, the cost of application has been less for the short stringers. At present, this differential in price either does not exist or is so small that it is of little consequence. On the other hand, in view of the shortage of men with which we are now contending, the advantages of easier handling and less bridge disturbed are much increased in favor of the short stringers.

Construction timbers of all kinds are hard to get at present, but we find that the shorter stringers are somewhat more easily obtainable, so far as the mills are concerned, because they can be cut from smaller trees, of which there are many more than there are of trees that will produce stringers 24 to 28 ft. long. While it is not debatable that continuous chords possess certain advantages that cannot be challenged by chords of single-panel length, in view of the care with which bridge timbers are now prepared and treated, I am not convinced that these advantages so far overshadow the disadvantages of the shorter stringers that they preclude their use.

Should Spikes Be Raised?

Where traffic is heavy and train speeds high, should spikes that are driven tightly against the rail be raised slightly prior to cold weather to prevent their breaking when the track becomes frozen solidly? Why?

Keep Them Down

By W. H. Sparks
General Inspector of Track, Chesapeake & Ohio, Russell, Ky.

Our trouble is primarily to keep the spikes driven down tight against the rail; we find no necessity at any time for raising them to prevent their breaking. The wave motion of the rail tends to withdraw them; the wear on the ties by the tie plates tends to keep them from remaining tight; and loose bolts, and defects in line and gage tend to loosen them still further. When we lay rail, the spikes are driven to a full bearing on the top of the base and we endeavor to keep them in this position, so far as practicable. This necessitates that they be tapped down from time to time, and the heavier the traffic and the higher the speeds, the greater is the

attention that should be given to keeping the spikes tight. After all, since the spikes tend to get loose through the ordinary action of traffic, there need be no loosening because of weather conditions.

They Are Never Tight

By A. E. Perlman
Chief Engineer, Denver & Rio Grande Western, Denver, Colo.

Spikes are never tight against the rail except for a short time after the rail is laid or where they have been tapped down by the section forces. The wave motion of the rail under traffic tends to keep them pulled slightly, but not excessively where track is well maintained. We experience no trouble from spikes breaking during cold weather, and we have extremely low temperatures on some sections of the Rio Grande.

It Is a Good Idea

By Roadmaster

I consider that the suggestion contained in the question is a good one, provided the spike heads are in contact with the rail, but a still better idea will be to drive them originally so that the contact will not be made. Some roads are using a spike that is so designed that it will not be in contact with the rail when it is driven down, that is, there will be no contact between the head of the spike and the top of the rail base.

Many years ago, when I started working on the track, we always raised the spikes in the fall and drove them down in the spring. We found, however, that this practice was an important factor in shortening the life of the ties, as it is today where it is still followed, as it is to a considerable extent in some of the colder sections of the country. When ties are frozen solidly in the roadbed there is still wave motion in the rail, and one of the two things must happen: either the spike head snaps off, if it is in contact with the rail, or the spike is withdrawn to establish freedom for the wave motion of the rail.

I have tracks that are embedded in concrete 18 in. thick, but even on this completely solid roadbed wave motion of the rail is still apparent, although less in amount than on the more elastic foundation provided by the ballast. Camp's Notes on Track, published almost 40 years ago, gave definite amounts of rail deflection, and accurate tests since then have verified the facts there stated, placing about half of the total depression of the rail in the roadbed and the remainder in the tie, the tie plate and the rail, although Camp's figures have been modified somewhat by the heavier and stiffer rail sections that are in use today.

With the wave motion always present, if the ties are frozen solidly in the ballast, and if the spikes are driven snugly against the rail base, they must resist the entire force of the uplift as the wave motion progresses. The same action takes place when the track is not frozen, but at this time the ties are free to move and thus relieve the pressure on the spike heads. This is the principal reason why newly-installed ties tend to pump within a few days after they are inserted. For these reasons, I instruct my foremen to drive the spikes only to within about 5/8 in. of contact. Incidentally, the stiffer the rail, the farther the wave motion extends and the larger the number of ties thus affected. In wet spots, the wise foreman, if he cannot take care of the drainage, will bleed the joints and raise the spikes until the ties are no longer swinging. This will stop churning until such time as the drainage can be improved.

My observation of track embedded in concrete is that this is an ideal form of construction. Further observation of installations of rigid and semi-rigid track with bolted and spring fastenings, shows clearly that wave motion of the rail is always present, and that, regardless of theory, this is the cause of failure of these types of track in service. The rigid and semi-rigid fastenings for the rail result in an inherent tendency for the ties to pump, and make the track difficult to maintain. Since the wave motion, seemingly, cannot be eliminated, why not allow for it? Better track will result.

Shipping Ties for Next Year

In view of the present density of traffic, how should ties for next year's renewals be shipped and distributed to conserve cars? When should this be done?

Get Them Early

By W. H. Sparks
General Inspector of Track, Chesapeake & Ohio, Russell, Ky.

If possible, ties should be shipped out on the line during the late fall or the winter, so that they will be on hand by the time they are wanted in the spring. If possible, enough cars should be loaded at one time to make it practical to employ a train for unloading them, because in this way they can be placed at the points where they are to be used. This reduces after-handling to the minimum and eliminates some of the hazards connected with the distribution when they are unloaded at stations and later trucked to the points of use, in which case they must be handled several times.

Obviously, it will be more difficult at some times than it is at others to obtain cars for tie shipments, while they may be more readily available on some roads than on others. Among the reasons for this, some commodities for which special types of cars are provided, such as live stock for instance, are seasonal; again the distance that the ties must be moved may vary between wide limits, making it possible to obtain cars for some of the ties and not for others; and ties can sometimes be loaded in cars that are going home or to some point for other loading, without causing them to be delayed unduly. If the ties must be moved in the opposite direction, less cars may be available for handling them.

The necessity for keeping cars in revenue service is fully recognized, particularly at this time when there is no reserve of equipment and when the movement of raw materials and finished products plays so important a part in the prosecution of the war. On the other hand, however, the need for materials to maintain the tracks and other facilities in condition to handle the war traffic is of no less importance, for if the railroads break down, so will all other military activities.

When In Least Demand

By C. O. Enlow
Roadmaster, Panhandle & Santa Fe, Lubbock, Tex.

This matter goes further than the mere shipment of the ties, for the tie estimates should be made as early as possible in the year preceding their use, with information as to the time

that delivery is desired, to enable the purchasing department to procure them in ample time for seasoning and treatment. Our ties are generally shipped in coal, stock and rough box cars and in regularly-assigned tie cars, which, except the latter, should be used only when there is least demand for them for revenue service. During the year many of these cars will be idle for varying periods. The stores department should be able to keep in touch with the car situation and ship the ties when cars are obtainable.

We usually receive our ties in the late winter or early spring and unload them by train, distributing them as nearly as possible where they are to be used. Under present conditions of abnormal traffic and man-power deficiency, I prefer to unload the ties by train and place them in piles along the track about where needed. Then, if we are delayed and do not insert them before we must run the weed burners, the mowing machines and other track machines, it will not be necessary to move them back to prevent interference with the machines or damage to the ties by reason of fire from the weed burners. When they are unloaded in this manner, it is much easier to keep a correct check of what is on hand and, in case renewals must be deferred for some time, the ties can readily be placed in stacks until needed.

Man-Hours Not Productive

By Anton Kallas
Section Foreman,
Chicago & North Western, Dixon, Ill.

It is customary for the tie plant to ship the ties in the spring, well before the frost is out of the ground, so that they will be on hand before tie renewals are started. They should be shipped in sufficient quantities to provide a full day's unloading, so that they can be handled economically by a work train. In this way the ties can be delivered exactly where they are to be used, without any extra handling.

Many roads now ship ties out in one or two car lots to individual sections during the winter. In this case they must be unloaded and piled on the station grounds until they can be distributed. When the spring rush starts, they are loaded again onto motor-car trailers and hauled out to the point of use. This system requires double handling and non-productive man-hours, at a time when there is need to conserve every hour of labor possible. In addition, every time that a tie is handled, the chances of personal injury are increased, and trains are sometimes delayed because the ties must be hauled out on the line under flag protection.

Requires Co-operation

By C. D. Turley
Engineer of Ties and Treatment,
Illinois Central, Chicago

This problem requires close co-operation between the various departments involved in the loading, the transportation and the receipt of the ties. There is not only a shortage of cars, but an acute shortage of ties as well, brought on by a general shortage of man-power. In normal times, ties should be shipped when cars can be spared from revenue freight service; consideration should also be given to other plans that fit in with the traffic scheme of the particular road, such as loading different kinds of cars at different seasons, loading cars in the direction of home, and handling as many ties as possible during the winter months when most outside work is at a standstill. Under present conditions, however, the problem is to ship ties when they become available, with as litttle interference as possible with revenue traffic and minimum delay to track work.

Inspection of Buildings

In what ways do present shortages in labor and materials affect the regular inspection of buildings? What items should be observed particularly at this time? Who should make the inspection?

Inspection Not Affected

By General Inspector of Buildings

Neither shortages of labor nor of materials should be allowed to affect the inspection of buildings, which is merely an investigation to determine the condition of the structures and the defects that need correction. However, in view of the situation with respect to labor and materials, the action to be taken may of necessity be modified considerably, compared with normal times. For this reason, the record of the inspection should list, first, those items that require immediate attention and, second, those which can be deferred temporarily without too much detriment to the functions or the life of the structure.

The plans that are based on this inspection should contemplate the fullest possible use of those newer materials that are not on the critical list. For example, if the floor in a station is badly worn, it can be resurfaced with one of the flexible floor tiles now available; if the siding of a frame building needs renewal, plan to use asbestos cement siding or shingles; and if interior walls need attention, there are several wall materials suitable for this purpose that will add to the appearance of the interior. These are only a few examples of what can be done without encroaching on the list of critical materials, and they have the advantage of requiring the minimum of labor for their application. Many of these materials also provide long life and better appearance.

Make Two Lists

By A. G. Dorland
Assistant Engineer, Elgin, Joliet & Eastern,
Joliet, Ill.

Present shortages of labor and material should affect the reports on the inspection of buildings. In the first place the supervisory officer should list carefully the different jobs, making two lists, the first to include the work that must be done during the following year, and the second those items that should be done but that can possibly be postponed.

The picture is changing almost from day to day with respect to critical materials, and some materials that are not available now may be much more plentiful by next spring or summer. However, there is no relief in sight in the matter of labor, in which there is a critical shortage.

In some cases it may be advisable to make only partial repairs, holding the remainder of the work over to the following year, but keeping in mind that our main endeavor should be to win the war as soon as possible, and that we must not use either labor or material on jobs that are not absolutely necessary. With steel tanks, coaling stations and structural steel to be painted, spot painting may suffice if the surface is not too bad.

NEWS of the Month

Carriers To Accept Extended Rate Cut

The Interstate Commerce Commission has been informed that the railroads will not oppose an extension to July 1, 1944, of the suspension of the freight rate increases which the federal body on April 6 ordered into effect from May 15 to January 1, 1944. The railroads decision to accept the extended rate cut was made in response to the commission's show-cause order in its Ex Parte No. 148 proceedings.

Railroads Have 116,000 Jobs Open

The Railroad Retirement Board has estimated recently that needs for additional personnel for the entire railway industry aggregated 116,000 persons on October 1, compared with 107,000 as of September 1. This estimate is based on reports from railroads which showed that 99,309 workers were needed by the 190 lines reporting.

Eastman Asks Curtailment of Christmas Civilian Travel

Director Eastman of the Office of Defense Transportation has asked all agencies of the federal government as well as private employers to refrain from granting vacations or time off to workers between December 17 and January 10 where such leave would result in travel. At the same time, Mr. Eastman requested both government and business to make special efforts to curtail business travel during the same period in all cases where it can be deferred without impairing the war effort. Mr. Eastman explained that the two requests were part of the ODT's plan to co-operate with the nation's carriers in seeking to diminish unnecessary civilian travel.

Gross Lauds Work of Army Railroad Men

That the work being done by America's Military Railway Service abroad is contributing in large measure to the great gains that have been and are being made by the armed forces of the United Nations was asserted in a recent radio statement by Maj. Gen. Charles P. Gross, chief of the Army Transportation Corps, shortly after he had returned to the United States following a 45,000 mile tour of the fighting fronts.

"For instance," General Gross said, "our railroaders increased the capacity of the French railroads in North Africa 70 per cent. They advanced with the troops in the invasion of Sicily, and are now in Italy restoring rail operations behind our front lines from Naples and Salerno. In the Persian Gulf Corridor, they increased railway capacity from practically nothing to some 130,000 tons a month, thereby getting to Russia half of the supplies which are covered in the protocol agreement for that route."

Although railroading in the fighting zones is very difficult, General Gross commented, "our men are tackling it with ingenuity, courage and determination. Some notable feats of valor," he added, "have been performed in this war by our railroaders in getting to the front men and supplies which must reach there if our armies are to be victorious."

More Steel Allocated For First Quarter of 1944

Further improvement in the War Production Board's allotment of carbon steel and other necessary controlled materials for domestic transportation for the first quarter of 1944 is revealed by the figures released by the Office of Defense Transportation.

The transportation industry will receive a total of 1,564,000 tons of carbon steel for the ODT program for the first quarter, as compared with 1,380,000 tons for the fourth quarter of 1943 and 1,200,000 tons for the third quarter. Requisite amounts of alloy steel, copper, and aluminum were also allocated for use with the carbon steel, it was pointed out.

ODT officials said that although the allocation of 1,564,000 tons of carbon steel is less than the amount proposed by ODT as the minimum requirement for domestic transportation, it appears to be the maximum quantity that can be utilized in the first quarter of 1944 by the manufacturers of domestic transportation equipment and steel rail mills in the light of shortages of manpower and facilities.

Rail Replacement: Under the allocations announced today, the railroads will receive 475,000 short tons of replacement rail and additional steel for accessories. This allocation contrasts with 400,000 tons of rail for the fourth quarter of this year.

The ODT was assured by the WPB Requirements committee that, subject only to unforeseen military requirements, it will receive a minimum annual figure of 1,800,000 tons for new replacement rail for 1944 so that annual allocations can be made to individual carriers on that basis, with the understanding that any increased tonnage produced during the year can be allocated from time to time. ODT officials emphasized that the amount of rail allocated to the ODT will be limited only by manpower supply.

Supreme Court Upholds Mediation Board's Authority

In three decisions handed down November 22, the Supreme Court of the United States upheld the final authority of the National Mediation Board in settling jurisdictional disputes between railway unions and in directing the classification and grouping of employees in voting on such questions. In effect, the principle is established that no appeal can be taken to the courts from the board's findings in such disputes.

Calls for Passenger Fare Tax of 15 Per Cent

The Revenue Bill of 1943, as reported from the House committee on Ways and Means, will increase from 10 per cent to 15 per cent the tax on passenger transportation and leave unchanged the tax on transportation of property. The committee estimated that the increase in the passenger-fare tax will yield $75,000,000 a year. The Treasury had recommended that the passenger-fare tax be increased to 25 per cent and the freight tax be repealed.

Victory Garden Plaque Awarded Illinois Central

The National Victory Garden Institute has awarded a plaque to the Illinois Central in recognition of its encouragement of the cultivation of victory gardens in its territory and on its right-of-way during 1943. Several thousand I.C. workers participated in a victory garden contest sponsored by the railroad and 1,575 of these used company property, cultivating available ground on the right-of-way in Iowa, Illinois, Kentucky, Tennessee, Mississippi and Louisiana.

Personal Mention

General

C. A. Knowles, valuation engineer of the Chesapeake & Ohio with headquarters at Richmond, Va., has been appointed assistant to the vice-president of that company with headquarters at Richmond.

Charles B. Bryant, engineer of tests on the Southern, has been promoted to assistant to the vice-president in charge of research and tests, with headquarters at Washington, D.C.

J. W. Treadwell, assistant superintendent of the Colorado division of the Missouri Pacific with headquarters at Pueblo, Colo., and an engineer by training and experience, has been promoted to superintendent of the Louisiana-Little Rock divisions, with headquarters at Monroe, La. **J. L. White,** roadmaster on the Colorado division, has been advanced to assistant superintendent, succeeding Mr. Treadwell.

Engineering

James F. Farrin, assistant engineer on the staff of the chief engineer of the Illinois Central, with headquarters at Chicago, has retired after more than 30 years' service.

J. C. Nichols, bridge inspector on the Louisville & Nashville at Louisville, Ky., has been promoted to assistant bridge engineer, system, with the same headquarters.

Charles H. Lowe, office engineer of the Houston division of the Southern Pacific Lines in Texas and Louisiana, has been promoted to assistant division engineer of the Houston division, with headquarters as before at Houston, Tex.

F. A. Williams, assistant supervisor of work equipment of the Chicago, Rock Island & Pacific, has been appointed acting supervisor of work equipment, with headquarters as before at Chicago, succeeding **L. J. Turner,** who has been granted a leave of absence due to illness.

J. T. Derrig, assistant to the chief engineer of the Northern Pacific at St. Paul, Minn., has been promoted to acting assistant chief engineer, lines west of Livingston, Mont., with headquarters at Seattle, Wash., replacing **A. F. Stotler,** who has been granted leave of absence due to illness.

C. L. Crummett, supervisor of track on the Chesapeake & Ohio, with headquarters at Charlottesville, Va., has been promoted to assistant division engineer of the Richmond division, with headquarters at Richmond, Va., to replace **S. H. Poore,** who has entered military service.

J. A. A. Destroismaison has been appointed division engineer on the Canadian National, with headquarters at Capreol, Ont., to succeed **W. H. Mellor,** who has been transferred to Allandale, Ont., to replace **F. C. Mattocks,** whose death is noted elsewhere in these columns.

W. W. Salisbury, master of trains and tracks on the Missouri-Illinois (part of the Missouri Pacific), at Bonne Terre, Mo., has been promoted to division engineer of the St. Louis Terminal-Illinois divisions of the Missouri Pacific, with headquarters at St. Louis, Mo., succeeding **H. M. Noel,** who has been appointed roadmaster on the St. Louis Terminal division.

E. J. Goodale has been appointed valuation engineer of the Central of New Jersey with headquarters at Jersey City, N.J. Mr. Goodale graduated in civil engineering from Syracuse University in 1913. In

E. J. Goodale

May, 1920, he entered the service of the Central of New Jersey in the valuation department. He has since held various positions in that department and in the real estate and tax department, primarily in charge of valuation matters, including insurance valuations and depreciation studies.

H. L. Vandament, district engineer on the Chesapeake & Ohio, with headquarters at Huntington, W. Va., has been promoted to the newly-created position of principal assistant engineer, with headquarters at Richmond, Va., and **P. L. Graves,** resident engineer at Clifton Forge, Va., has been promoted to district engineer at Huntington, to succeed Mr. Vandament. **W. F. Drumeller,** chief clerk to the chief engineer, has been promoted to the newly-created position of assistant to the chief engineer, with headquarters as before at Richmond, Va.

R. C. Violett, roadmaster on the Oklahoma division of the Chicago, Rock Island & Pacific at El Reno, Okla., has been promoted to district maintenance engineer, with the same headquarters, succeeding **C. B. Murray,** who has been transferred to Kansas City, Mo., relieving **S. T. Robertson,** who has been appointed engineer of rail and welding, with headquarters at Chicago.

J. A. Irvine, assistant district engineer of the Quebec district of the Canadian Pacific, has been promoted to district engineer, with headquarters as before at Montreal, Que., succeeding **D. Hillman,** who has retired. **J. H. Reeder,** general tie and lumber agent, has been advanced to assistant district engineer of the Quebec district, with headquarters as before at Montreal, replacing Mr. Irvine.

C. R. Uitts, assistant division engineer of the Pennsylvania at Ft. Wayne, Ind., has been promoted to division engineer on the Indianapolis division, with headquarters at Indianapolis, Ind., succeeding **R. W. Speidel,** who has been granted leave of absence to serve with the 717th Railway Operating Battalion. **L. A. Evans,** supervisor of track on the Pittsburgh division at Derry, Pa., has been advanced to assistant division engineer at Ft. Wayne, replacing Mr. Uitts.

I. H. Schram, engineer maintenance of way of the Eastern district of the Erie, with headquarters at Jersey City, N.J., has been appointed acting chief engineer maintenance of way of the system, with headquarters at Cleveland, Ohio, in place of **J. C. Patterson,** who has been granted a leave of absence, effective November 1. **C. K. Scott,** division superintendent at Salamanca, N.Y., has been appointed acting engineer maintenance of way of the Eastern district at Jersey City, to succeed Mr. Schram.

E. R. Logie has been appointed engineer maintenance of way of the Central region of the Canadian National, with headquarters at Toronto, Ont., replacing **L. Brousseau,** whose death is noted elsewhere in these columns. Mr. Logie, who was formerly district engineer at Toronto, had been acting engineer maintenance of way since Mr. Brousseau was furloughed some time ago because of ill health. **H. E. Smith,** acting district engineer at Toronto, and formerly assistant engineer, has been appointed district engineer, succeeding Mr. Logie.

Howard C. Forman, assistant engineer in the office of the chief engineer of the Louisville & Nashville at Louisville, Ky., has been promoted to division engineer on the Eastern Kentucky division. **R. E. Nottingham,** assistant division engineer on the Birmingham division at Birmingham, Ala., has been advanced to assistant engineer in the office of the chief engineer, succeeding Mr. Forman. **John U. Estes,** assistant supervisor of bridges and buildings on the Birmingham division, has been promoted to assistant division engineer, replacing Mr. Nottingham, and **James K. Gloster,** assistant engineer on the Birmingham division, has been advanced to assistant engineer in the miscellaneous department of the office of the chief engineer, succeeding **Robert L. Samuels, Jr.,** whose promotion to assistant supervisor of bridges and buildings on the Birmingham division is reported elsewhere in these columns.

G. H. Beasley, division engineer on the Louisville & Nashville at Ravenna, Ky., has been promoted to assistant engineer in the chief engineer's office, with headquarters at Louisville, Ky., succeeding **Edward Wise, Jr.,** whose promotion to engineer maintenance of way was reported in the November issue.

MODERN POWER DEMANDS Modern Track Maintenance

Woolery 5-burner in operation

OTHER WOOLERY MAINTENANCE UNITS

Woolery Tie Cutters and Creosote Sprayers are helping many railroads maintain track the modern way, with minimum expenditure of labor, time and money.

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William H. Huffman, whose promotion to division engineer on the Western division of the Chicago, St. Paul, Minneapolis & Omaha (a subsidiary of the Chicago & North Western) was reported in the November Issue of *Railway Engineering and Maintenance*, was born in Pierre, S.D., on March 24, 1911, and is a graduate of

William H. Huffman

Purdue University. He entered railway service on August 10, 1929, as a rodman on the North Western, working during summer months while still attending school. He served in that capacity on the Peninsula division of the North Western in 1933, and one year later he was transferred to the Madison division. On April 1, 1935, Mr. Huffman was appointed instrumentman on the Madison division and in July, 1940, he was promoted to engineering accountant, with headquarters at Chicago. In December of the same year he was advanced to assistant engineer on the Sioux City division, and on June 1, 1943, he was promoted to acting division engineer on the Western division of the C. St. P. M. & O., with headquarters at St. Paul, Minn., holding that position until his new appointment became effective on September 16.

Paul Hamilton, whose retirement as district engineer of the New York Central (Big Four), with headquarters at Cincinnati, Ohio, was reported in the November issue, was born at Kingston, Ind., on October 5, 1873, and graduated from the University of Michigan in 1896. He entered railway service in 1900 as an assistant engineer on the Cleveland, Cincinnati, Chicago & St. Louis (Big Four, now part of the New York Central), at Springfield, Ohio, being transferred to Cincinnati in the same year. In 1902 he was advanced to supervisor of track, with headquarters at Indianapolis, Ind., and in the same year he was promoted to engineer maintenance of way of the Cairo division, with headquarters at Carmel, Ill. One year later he was transferred to the Cincinnati-Sandusky division, and in 1912 to the Cleveland-Indianapolis division, with headquarters at Galion, Ohio. In the latter year Mr. Hamilton was promoted to engineer of track and roadway at Cincinnati, and in 1923 he was advanced to assistant chief engineer of the Big Four. On August 1, 1940, he was appointed to the position he held at the time of his retirement, effective November 1.

Walter S. Johns, Jr., engineer maintenance of way of the Northwestern district of the Pennsylvania at Chicago, has been promoted to assistant to the chief engineer, with headquarters at Philadelphia, Pa. **E. R. Shultz,** division engineer on duty in the office of the chief engineer at Philadelphia, has been advanced to engineer maintenance of way of the Northwestern district with headquarters at Chicago, succeeding Mr. Johns.

E. Y. Allen, assistant chief engineer on the Reading with headquarters at Philadelphia, Pa., has been promoted to chief engineer of that road succeeding **A. E. Owen,** who has resigned this post with the Reading while continuing, as heretofore, as chief engineer of the Central of New Jersey.

C. A. Maynor, whose retirement as division engineer of the Memphis division of the Illinois Central was reported in the September issue, was born at Morton, Miss., on March 17, 1874, and entered railway service in March, 1895, as a track laborer on the Canton district of the I.C. In the same year he was promoted to section foreman and in January, 1900, he went with the Street Railway & Light Co., Jackson, Miss., returning to the Illinois Central in April, 1903, as an extra gang foreman. On February 1, 1906, Mr. Maynor was advanced to track supervisor, with headquarters at Jackson, and on September 1, 1917, he was promoted to the position he held at the time of his retirement.

Loren F. Pohl, whose promotion to division engineer on the Kansas City division of the Chicago, Milwaukee, St. Paul & Pacific was reported in the November issue, was born at St. Cloud, Minn., on August 20, 1899, and graduated from Engineering College of the University of Minnesota in March, 1927. In October of the same year he was appointed a junior examiner for the Interstate Commerce Commission on Valuation Order No. 3 work at St. Paul, Minn., and in April, 1928, he went with the Great Northern as an instrumentman on construction of the Saco-Turner branch line, with headquarters at Malta, Mont. On January 15, 1931, Mr. Pohl was appointed an instrumentman on the Milwaukee at Aberdeen, S.D., later serving in the same capacity at Savanna, Ill., and Chicago. In April, 1936, he was advanced to assistant engineer at Ottumwa, later being transferred to Marion, Iowa, and Miles City, Mont. In June, 1943, he was transferred to La Crosse, Wis., remaining in that location until his new appointment, effective October 16.

Track

A. B. Simmons, whose promotion to roadmaster of the Missouri & Arkansas, with headquarters at Leslie, Ark., was reported in the October issue, was born in Searcy County, Ark., on September 9, 1890, and entered railroad service in January, 1912, as a section laborer on the M. & A. In September, 1922, he was promoted to section foreman, and two years later he was appointed tie inspector. On April 1, 1934, Mr. Simmons was advanced to roadmaster and a short time later he was appointed section foreman, holding that position until his new promotion, effective September 1.

G. J. Yorkston, transitman on the Canadian Pacific at Saskatoon, Sask., has been promoted to roadmaster on the Tyvan and Kisbey subdivisions, with headquarters at Regina, Sask., succeeding **A. Swanson,** who has been transferred to Broadview, Sask., replacing **A. Holmstrom,** who has been transferred to Ignace, Ont.

Wallace R. Payne, whose promotion to roadmaster on the Missouri Pacific, with headquarters at Conway Springs, Kan., was reported in the October issue, was born at Lebanon, Mo., on May 24, 1912, and entered railway service in June, 1929, as an extra gang laborer on the Eastern division of the Missouri Pacific, subsequently serving as assistant extra gang foreman until 1937 when he was promoted to section foreman on the Kansas City Terminal division. In August, 1937, Mr. Payne was advanced to track supervisor on the Colorado division, with headquarters at Ordway, Colo., holding that position until his new promotion, effective August 1.

Rodgers A. Hostetter, whose promotion to roadmaster on the Austin division of the Southern Pacific Lines in Texas and Louisiana, with headquarters at Austin, Tex., was reported in the October issue, was born at Van Alstyne, Tex., on June 7, 1909, and entered railway service with that road in 1930 as a welder's helper on the Dallas division, with headquarters at Ennis, Tex. In 1934 he was advanced to welding gang foreman on the Lafayette division at Lafayette, La. In 1936 he was transferred to the Dallas division and in March, 1943, he was promoted to assistant roadmaster of the Dallas division, with headquarters at Hearne, Tex., holding that position until his new appointment.

L. J. Gilmore, roadmaster on the Mesabi division of the Great Northern at Superior, Wis., has been promoted to general roadmaster, Lines West, with headquarters at Spokane, Wash., succeeding **George G. Smart,** who has retired after 43 years service.

H. J. McNally, assistant supervisor of track on the Eastern division of the Pennsylvania, has been promoted to supervisor of track on the St. Louis division, with headquarters at Greenville, Ill., replacing **Frank Aikman, Jr.,** who has been transferred to Derry, Pa., relieving **L. A. Evans,** whose promotion to assistant division engineer at Ft. Wayne, Ind., is reported elsewhere in these columns. **W. J. Ott,** assistant supervisor of track on the Philadelphia division, has been transferred to the Eastern division, succeeding Mr. McNally. **A. S. Barr,** assistant supervisor of track on the Philadelphia Terminal division, has been advanced to supervisor of track on the Cleveland division, with headquarters at Akron, Ohio, succeeding **H. W. Seeley,** who has been

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If your present cars are equipped with Timken Bearings you are getting all of these advantages. And when you buy new cars you again will specify "Timken Bearing Equipped"; you know it pays. The Timken Roller Bearing Company, Canton 6, Ohio.

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transferred to the Erie and Astabula division, replacing **W. N. Myers,** who has been transferred to the Middle division. **D. J. Marotta,** assistant supervisor of track on the Williamsport division, has been transferred to the Philadelphia Terminal division, succeeding Mr. Barr. **L. W. Hogston,** assistant supervisor of track on the Middle division, has been promoted to supervisor of track on the Panhandle division, and **W. F. Lybarger,** assistant supervisor of track on the Conemaugh division, has been transferred to the Middle division, replacing Mr. Hogston.

William O'Brien, track supervisor on the Toledo-Ludington division of the Pere Marquette, with headquarters at Toledo, Ohio, has resigned on account of illness.

Adolph Carlson, roadmaster on the Canadian Pacific at Red Deer, Alta., has been transferred to Consul, Alta, succeeding **Fred T. Boyar,** who has been transferred to Red Deer.

B. Williamson, general foreman for the Illinois Central at Paducah, Ky., has been promoted to acting track supervisor, with the same headquarters, succeeding **M. F. Ward,** who has been transferred to Princeton, Ky., replacing **W. R. Pruitt,** who has been granted leave of absence to enter military service.

Henry Stone, a section foreman on the New York Central, has been promoted to assistant supervisor of track in charge of Subdivision 16 of the St. Lawrence division, with headquarters at Richland, N.Y., to succeed **Joseph Corbett,** whose death is noted elsewhere in these columns.

J. E. Stennett, assistant supervisor of track on the Chesapeake & Ohio, with headquarters at Richmond, Va., has been promoted to supervisor of track, with headquarters at Charlottesville, Va., succeeding **C. L. Crummett,** whose promotion to assistant division engineer is noted elsewhere in these columns. **W. H. Barksdale,** assistant cost engineer, has been advanced to assistant supervisor of track at Richmond, to succeed Mr. Stennett.

W. H. Shideler, roadmaster on the Wichita division of the Missouri Pacific with headquarters at Yates Center, Kan., has been promoted to master of trains and tracks on the Missouri-Illinois (part of the Missouri Pacific), with headquarters at Bonne Terre, Mo., succeeding **W. W. Salisbury,** whose promotion to division engineer on the St. Louis Terminal-Illinois divisions of the Missouri Pacific is reported elsewhere in these columns. **E. A. Courtney,** roadmaster on the Little Rock division of the Missouri Pacific, has been transferred to the Wichita division, replacing Mr. Shideler. **M. McGehee,** assistant roadmaster on the Louisiana division, with headquarters at Ferriday, La., has been promoted to roadmaster on the Little Rock division, relieving Mr. Courtney, and **R. C. Williams,** extra gang foreman on the Memphis division, has been advanced to assistant roadmaster at Ferriday, replacing Mr. McGehee. **L. L. Wallis,** track supervisor at Little Rock, Ark., has been promoted to roadmaster on the Arkansas division, with headquarters at El Dorado, Ark., and **L. E. Smith,** roadmaster on the St. Louis Terminal division, has been transferred to the Colorado division, with headquarters at Pueblo, Colo.

Bridge and Building

J. B. Graham, bridge and building master on the Canadian National, with headquarters at Prince Albert, Sask., has retired after 38 years service.

L. H. White, general foreman on the Illinois Central at Carbondale, Ill., has been advanced to acting supervisor of bridges and buildings, with the same headquarters, succeeding **Lora Sullivan,** who has been granted a leave of absence.

J. C. Nichols, bridge inspector on the Louisville & Nashville at Louisville, Ky., has been promoted to assistant bridge engineer, system, with the same headquarters. **Charles Soard,** assistant bridge inspector, has been advanced to bridge inspector, with headquarters as before at Louisville, succeeding Mr. Nichols.

L. H. Davis, acting general foreman of bridges and buildings on the Plains division of the Atchison, Topeka & Santa Fe, has been promoted to general foreman of bridges and buildings, with headquarters as before at Amarillo, Tex., succeeding **Edgar L. Conner,** whose death on August 1 was reported in the October issue.

James A. Carpenter, assistant supervisor of bridges and buildings on the Louisville & Nashville at Mobile, Ala., has been promoted to supervisor of bridges and buildings, with the same headquarters, succeeding **A. J. Catchot,** who has been assigned to other duties. **Robert L. Samuels, Jr.,** assistant engineer, miscellaneous department, in the office of the chief engineer at Louisville, Ky., has been advanced to assistant supervisor of bridges and buildings on the Birmingham division, with headquarters at Birmingham, Ala.

N. R. Robinson, whose promotion to supervisor of bridges and buildings on the Southern Pacific, with headquarters at Sacramento, Cal., was reported in the November issue, was born in Canada on December 9, 1896, and entered railway service on May 2, 1922, as a construction carpenter on the Southern Pacific. Mr. Robinson subsequently served as bridge and building foreman and bridge inspector at various points on the road until June, 1937, when he was advanced to assistant supervisor of bridges and buildings at Sacramento, the position he held at the time of his new appointment.

William V. Kerns, whose promotion to supervisor of wood preservation in charge of the tie and lumber treating plant of the Chicago & North Wester at Escanaba, Mich., was reported in the November issue, was born at Moline, Ill., on February 8, 1891, and graduated in civil engineering from Swarthmore College in 1913. He entered railway service in June of the same year as a rodman on the Pennsylvania at Jersey City, N.J., and three years later he became an instrumentman on the North Western at Chicago. After serving with the U. S. Army during World War I, he returned to the North Western in April, 1919, working in the maintenance of way department at Chicago, Sioux City, Iowa, and Boone. In May, 1924, Mr. Kerns was promoted to assistant bridge inspector, with headquarters at Chicago, and in 1936 he was advanced to assistant supervisor of bridges and buildings at Huron, S.D., later being transferred to Boone. In October, 1942, he was granted leave of absence to work for the government as supervising engineer on the Defense Plant Corporation at Kansas City, Mo. In September, 1943, Mr. Kerns returned to the North Western as assistant supervisor of bridges and buildings, and on October 1 he was promoted to his new position.

Obituary

W. L. Roller, division engineer on the Chesapeake & Ohio at Columbus, Ohio, died on November 19 of a cerebral tumor, after an extended illness.

Joseph Corbett, assistant supervisor of track on the St. Lawrence division of the New York Central, with headquarters at Richland, N.Y., died on October 23.

Lucien Brousseau, engineer maintenance of way on the Central region of the Canadian National, with headquarters at Toronto, Ont., died on October 20 after an extended illness. Mr. Brosseau was born at Sorel, Que., in 1887, and entered railway service in 1913 as division engineer on the Intercolonial (now the Canadian National), with headquarters at Levis, Que. In July, 1939, he was promoted to the position he held at the time of his death.

Walter M. Dawley, who retired in 1940 as engineer in the land and tax department of the Erie, with headquarters at Cleveland, Ohio, died at his home in Manhattan, Kan., on October 3.

Howard C. Phillips, former chairman Western Group, of the Engineering Committee of the Presidents' Conference Committee on Federal Valuation of the Railroads, died at his home in Winnetka, Ill., on November 14. Mr. Phillips was born at New York on May 6, 1869, and graduated from Princeton University in 1890. He entered the service of the Santa Fe in 1899 as an inspecting engineer, subsequently serving in various capacities until September, 1906, when he was promoted to chief engineer of the Coast Lines with headquarters at Los Angeles, Cal. From April, 1912, to August, 1915, Mr. Phillips served as valuation engineer of the Santa Fe System at Chicago, then becoming assistant general secretary of the Presidents' Conference Committee on Federal Valuation of the Railroads, later serving as general secretary of the same body. From May, 1918, to August, 1921, he served as chairman Western Group, of the Engineering Committee of the Presidents' Conference Committee on Federal Valuation of the Railroads at Chicago, resigning on the latter date to engage in consulting engineering practice.

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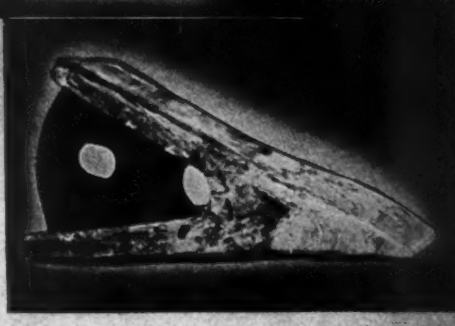
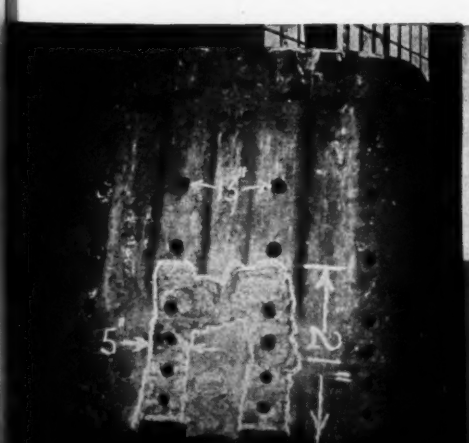
It was logical that this should be a Taylor-Wharton development. Taylor-Wharton introduced Hadfields Manganese Steel to America in 1892 and has since led the advance in its use and refinement. TISCO Manganese Steel is known the world over for its unusual resistance to heavy shock and abrasion, and for its remarkable property of work hardening. It is used in the wearing parts of various equipment including paper making, mining, quarrying, dredging and for railway trackwork.

Above: Mantle of gyratory crusher, rebuilt with Timang, equals original service record.



Right: Steam Shovel point repaired with Timang, works like new.



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Association News

Bridge and Building Association

President J. L. Varker has called a meeting of the Executive committee in Chicago on December 6 to select committees and organize the work of the association for the new year.

Roadmasters Association

Members of the Executive Committee met in Chicago on November 8 to authorize the publication of reports of committees presented at the September meeting of the Executive Committee and to select the personnel of committees to study and report next September on subjects selected at the last meeting.

Maintenance of Way Club of Chicago

One hundred and seventy-two members and guests, a record attendance for a November meeting, and the third largest attendance in the history of the club, were present at the meeting which was held in the Ambassador room of Huyler's restaurant in the Straus building, Chicago, on the evening of November 22. The meeting was addressed by G. M. O'Rourke, assistant engineer maintenance of way, Illinois Central, Chicago, who described the twenty miles of track tests recently installed on the main line of the Illinois Central north of Kankakee, Ill. Following this address, a moving picture of the installation was shown by G. M. Magee, research engineer, Engineering Division, Association of American Railroads.

The next meeting of the club will be on December 20, at which meeting four track men will discuss What We Have Done to Prepare for Winter.

American Railway Engineering Association

During November, five committees held meetings as follows: Records and Accounts at Cincinnati, Ohio on November 2 and 3; Buildings at New York on November 3 and 4; Economics of Railway Labor at Chicago on November 11; Wood Bridges and Trestles at Chicago on November 11; and Co-operative Relations with Universities at Evanston, Ill., on November 15. No committee meetings have been scheduled for December.

Bulletin No. 442 for December is being printed and should be in the mails by December 15. This bulletin will include reports of the following committees: Buildings; Highways; Yards and Terminals; Maintenance of Way Work Equipment; and Economics of Railway Labor.

Metropolitan Maintenance of Way Club

At the next meeting of the club, which will be held at the Hotel Governor Clinton, New York City, at 12:30 p.m. on December 9, the principal speaker will be R. C. Randall, general manager of the Eastern district of the Erie, whose address will be entitled "What Management Will Expect of the Track Man in the Post-War Period". In accordance with past practice, this meeting is scheduled to be held on the same day as the annual dinner of the New York Railroad Club.

The last meeting of the club was held at the Hotel Governor Clinton on October 29. This meeting was featured by a showing of a film that is used on the New York Central as an aid in training employees in recommended rail-laying practices. The film was shown by C. B. Bronson, inspecting engineer. Eighty-five members and guests were in attendance.

Supply Trade News

General

The **Eppinger & Russell Company,** New York, has acquired the wood preserving plant formerly operated by the Norfolk Creosoting Company at Norfolk, Va.

The **Oliver Farm Equipment Company,** Shelbyville, Ill., has taken over the manufacture of the products of the **Tallman Manufacturing Company,** following the retirement from business of **G. L.** and **L. R. Tallman,** owners.

The **Nordberg Manufacturing Company,** Milwaukee, Wis., has recently been awarded a third star for its Navy "E" pennant, indicating that since the pennant was awarded in May, 1942, the company has maintained its scheduled production of naval material for three six-month periods. The Nordberg organization has also received a star for its Maritime pennant which was awarded six months ago.

Personal

Walter H. Hinsch, chief engineer of the Dearborn Chemical Company, Chicago, who was granted a leave of absence on January 1, 1942, to serve as lieutenant-colonel of the 267th Field Artillery, was killed at Camp Van Dorn, Miss., on November 15 during maneuvers with live ammunition.

J. G. Graham, manager of railway sales for the **Oliver Iron & Steel Corporation,** has been appointed a member of the rails and accessories industry advisory committee of the War Production Board.

R. H. McCormick, formerly advertising manager of the Vascoloy-Ramet Corporation, has been appointed advertising manager of the **American Hoist & Derrick Co.**

B. Dunkley, an engineer and specialist in the industrial pumping field, has been appointed manager of a new office recently opened in Philadelphia, Pa., by the **Blackmer Pump Company,** Grand Rapids, Mich. The area to be served by the new branch includes eastern Pennsylvania, southern New Jersey and a part of Delaware.

Edward J. Burnell, formerly vice-president and general manager in charge of operations of the **Link-Belt Company's** Pershing Road plant and central division sales in Chicago, has been transferred to the executive offices in Chicago as vice-president in charge of sales.

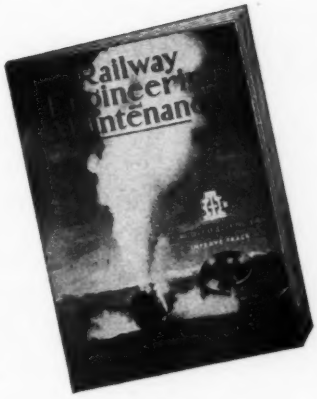
Joseph B. Terbell has been appointed first vice-president of the American Manganese Steel division of the **American Brake Shoe Company.** Mr. Terbell was graduated from the Sheffield Scientific

Joseph B. Terbell

School of Yale University in 1928, and joined the American Managanese Steel division in October of that year. After serving an apprenticeship of about two years in the company's Chicago Heights plant, he entered the Chicago sales office. He was transferred to the Ramapo-Ajax division in 1931, and to the American Manganese Steel division's New York office in 1932. He moved to St. Louis, Mo., as assistant manager of the alloy department, in 1933, and to the sales department in Chicago in 1935. He was transferred to the American Forge division in 1936, returning to Amsco in 1937 as eastern sales manager in the New York office. Mr. Terbell was appointed a vice-president of the American Manganese Steel division in 1940, holding that po ition until his new appointment, effective December 1.

Morris H. Knudsen, chairman of the board of the **Morrison Knudsen Construction Company,** died in San Diego, Cal., on November 19.

Pipe Bending Handbook.—An 80-page handbook on pipe and tube bending has been published by the Copper and Brass Research Association, New York. Describing practical methods for bending pipe and tubes of copper, brass and related alloys, the handbook contains a number of unusually large illustrations, showing the various methods employed in working on different types and sizes of material. Each picture is accompanied by explanatory text.



Your Silent Salesman Who Calls Every Month On Your Prospects At Out-of-the-Way Points As Well As In The Metropolitan Centers

●

"Short Memories"

"Boss, why do we spend so much money for advertising? All the railway men know our products," said the star salesman to his railway sales manager.

"I wish I was sure of that, Bill," replied the railway sales manager. "But even if it *were* true today, they'd soon forget us if we stopped our advertising."

"Are you sure?"

"What brands of shaving soap, tooth paste or cigarettes did you use ten years ago?"

"I can't remember. I see your point: I never thought of it that way."

"That's important, though. Memory is short. We soon forget the name or the product we no longer see. It's one of the jobs of our advertising to keep *our* name before *our* customers. We can't afford to let them forget us."

"I see it now, Boss. We can't afford to drop out of a single issue of *Railway Engineering and Maintenance.*"

"We're not going to. It's as much a part of our sales expense as your salary."

RAILWAY ENGINEERING AND MAINTENANCE IS READ BY MAINTENANCE OFFICERS OF ALL RANKS

I. B. Cranes Play Vital Role in 1943 Shipbuilding Goal Of 19,000,000 Tons

Left: Launching of U.S.S. Raby (Destroyer Escort 698) Sept. 4, 1943 at Defoe Shipbuilding Co., Bay City, Mich.—a user of I. B. Cranes.

In 1943's shipbuilding achievement you'll find that not only the shipbuilders and workers themselves, but the hundreds of suppliers of equipment to build those ships have played a prominent role in this further advance toward allied victory.

Industrial Brownhoist Cranes, for example, are today helping many a bustling shipyard get ships built on time—and ahead of time. I. B. Cranes are lifting heavy subassemblies, handling heavy materials of every kind that go into Uncle Sam's fighting and merchant ships.

No matter what your material handling problem may be—today or tomorrow—it will pay you, as it is paying scores of America's biggest industries, to use Industrial Brownhoist Cranes. Industrial Brownhoist Corporation, Bay City, Michigan. Offices in New York City, Philadelphia, Pittsburgh, Cleveland and Chicago.

INDUSTRIAL BROWNHOIST BUILDS BETTER CRANES

13 Jobs You Can Handle WITH LeTOURNEAU RIGS

Work Off-Track . . . Make 50 to 60 Minutes of Every Work Hour Productive

You can save manpower, time and switching problems by handling these jobs with LeTourneau Carryall Scrapers, Dozers or Cranes:

- New grade construction
- Relocating grades and alignment
- Excavating for underpasses
- Strengthening slope shoulders
- Digging and cleaning ditches
- Shaping banks and slopes to eliminate snow traps
- Snow removal
- Moving, spreading or salvaging ballast
- Moving tracks
- Removing slides and washout materials
- Off-track work around wrecks
- Placing bridge members, pipe, etc.
- Loading and unloading cars

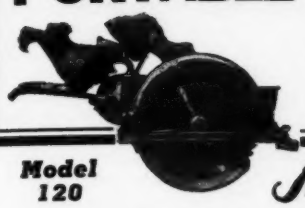
Ask our Field Engineers for further data on handling the above with LeTourneau equipment. Write now to Field Engineering, Dept. REM-12.

R. G. LeTOURNEAU INC

Peoria, Illinois • Stockton, California

HEAVY CONSTRUCTION EQUIPMENT

EASE the Labor Shortage with Mall TRADE MARK PORTABLE POWER Tools



Model 120

Mall Saw TRADE MARK

12" Blade—4 5/8" Cutting Capacity
Also Pneumatic Models

For extensive sawing and ripping heavy lumber and timbers. Also operates an abrasive wheel for sawing non-ferrous metal up to ½" in thickness, cutting and scoring tile, stone and concrete.

Mall CHAIN SAW TRADE MARK

5 H.P. **GASOLINE ENGINE MODEL**

36" Capacity.
Also available in 24" and 48" sizes.
Also Pneumatic Models

Cuts heavy timber and piling in a fraction of the time required by hand. Automatic clutch prevents stalling the engine when saw is forced or pinched too hard. Swivel feature permits cuts at necessary angles. Easily and quickly sharpened on the job.

1½ H.P.

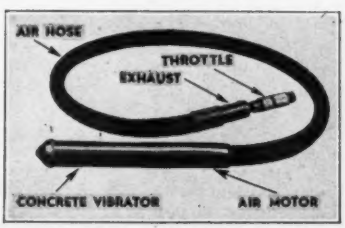
Mall TRADE MARK **CONCRETE VIBRATORS**

Gasoline Engine Model

Places low-water-cement-ratio concrete quickly and efficiently, assuring a strong, water-tight job free from honeycombs and voids that require hand patching. Variable speed engine operates eight other tools. Also 3 H.P. with round base or wheel barrow type mounting.

7500 r.p.m. Pneumatic Model

For placing concrete in tunnels, caissons and other deep construction Equipped with twist hand throttle for easy operation.



ARMY E NAVY

Write for literature and prices to Railroad Department.

MALL TOOL COMPANY
7746 SOUTH CHICAGO AVE. CHICAGO 19, ILLINOIS

Warm-ups
FOR "FROZEN" MOTORS AND MEN

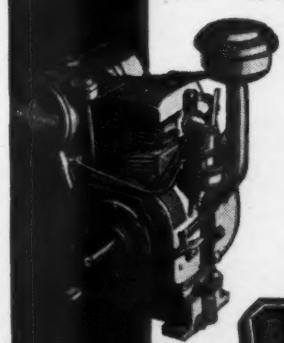
In bleak and frigid Northlands, air crews use unit heaters, powered by gasoline engines; to pre-heat motors, and other vital units of the plane — to prevent damage, and speed-up preparations for the take-off. One more front-line duty for the hundreds of thousands of dependable, instant-starting Briggs & Stratton 4-cycle engines serving our armed forces in hundreds of special and standard applications.

THE war's unprecedented demands have given us the opportunity to successfully meet a double challenge. ONE — to set new all-time records for production. TWO—to constantly maintain, even under wartime stresses, Briggs & Stratton high standards of quality, rugged dependability, precision manufacture and economical performance.

Thus we are better prepared than ever — to help on your present war needs or your postwar planning — and to keep up the Briggs & Stratton tradition as builders of "the world's finest air-cooled gasoline engines."

"It's powered right — when it's powered by Briggs & Stratton."

BRIGGS & STRATTON CORP.
MILWAUKEE 1, WIS., U. S. A.



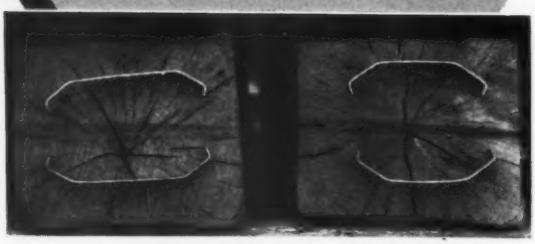
4 CYCLE BRIGGS & STRATTON GASOLINE ENGINES

BACK THE ATTACK
BUY WAR BONDS

Prolong Tie Life

ESSENTIAL ANY DAY

More Essential Than Ever—TODAY



BEEGLE Saf-Tie Irons

Assure Longer Service Life

Manufactured in accordance with the latest A. R. E. A. specifications, Beegle Saf-Tie Irons are especially designed to insure secure anchorage which prevents and arrests radial splitting and checking of ties.

Outstanding advantages of the Beegle Method of Double Ironing are:

(1) They reinforce both the upper and lower areas of the end sections of the tie against splitting;

(2) They provide a balanced reinforcing, which neutralizes the normal tendency of the tie to split and prevents the spreading of the resultant sections;

(3) They provide marginal defense in the areas of sap-wood where splitting begins and is most severe;

(4) They prevent the eventual exposure of untreated wood;

(5) They add substantial mechanical strength to the natural unitary strength of the tie.

Write us TODAY for full particulars. By spending a dime a tie now, for the application of two Beegle Saf-Tie Irons in each end, years can be added to the life of ties. A small amount invested now will save dollars immediately as well as during the years to come.

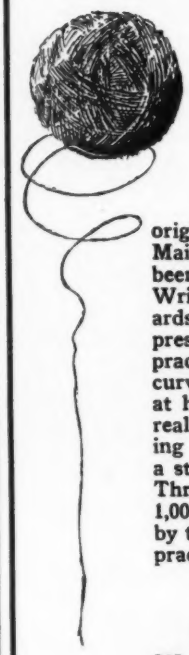
Beegle Irons are Better Irons.

BEEGLE TIE SERVICE COMPANY

East St. Louis, Illinois

NOW AVAILABLE

4th Edition



STRING LINING OF CURVES MADE EASY

By CHARLES H. BARTLETT

To meet the continuing demands for this booklet, reprinting a series of articles published originally in Railway Engineering and Maintenance, a fourth edition has just been printed and is now available.

Written to meet today's exacting standards for curve maintenance, this booklet presents in detail a method of proven practicability for checking and correcting curve alinement readily with tools that are at hand. It makes possible the accurate realinement of curves without engineering instruments or other appliances than a string and a rule.

Three editions of this booklet, each of 1,000 copies, have already been purchased by track men. Send for your copy of this practical aid for track maintenance.

Fifty Cents a Copy

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Use this section when seeking a new man, new position, or when buying or selling secondhand equipment.

CLASSIFIED ADVERTISEMENTS, $10.00 an inch, one inch deep by three inches wide, an insertion.

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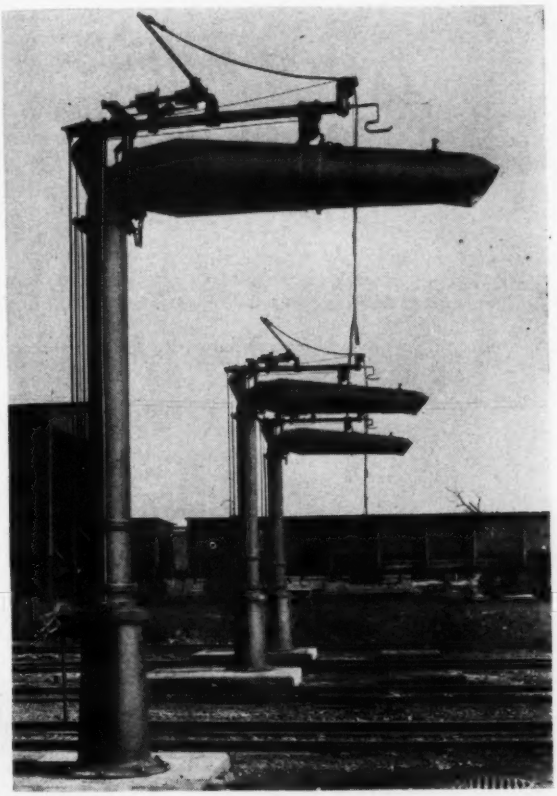
30, Ballast, Composite, 50-Ton
50, Box, 36-Ft., 40-Ton; Steel Ends
2, Dump, Western, Automatic, 20-Yd., 40-Ton
6, Dump, Magor, Automatic, 25-Yd., 50-Ton
8, Dump, Western, Automatic, 27-Yd., 40-Ton
2, Dump, Western, Automatic, 27-Yd., 50-Ton
10, Dump, Koppel, Side-Discharge, 24-Yd., 30-Ton
25, Flat, 40-Ft., 40-Ton
75, Gondola, Composite, 36-Ft. & 40-Ft., 40-Ton
50, Hopper, Double, 50-Ton
45, Hopper, Side-Discharge, 50-Ton
16, Refrigerator, 36-Ft., 30-Ton
50, Refrigerator, 40-Ft., 40-Ton

Locomotives and Passenger Cars too!

IRON & STEEL PRODUCTS, INC.
38 years' experience
13472 S. Brainard Ave., Chicago 33, Illinois
"ANYTHING containing IRON or STEEL"



Column Right!

For water, when you want it, as you want it, you're bound to go right with

Mansfield Type "B" Water Columns

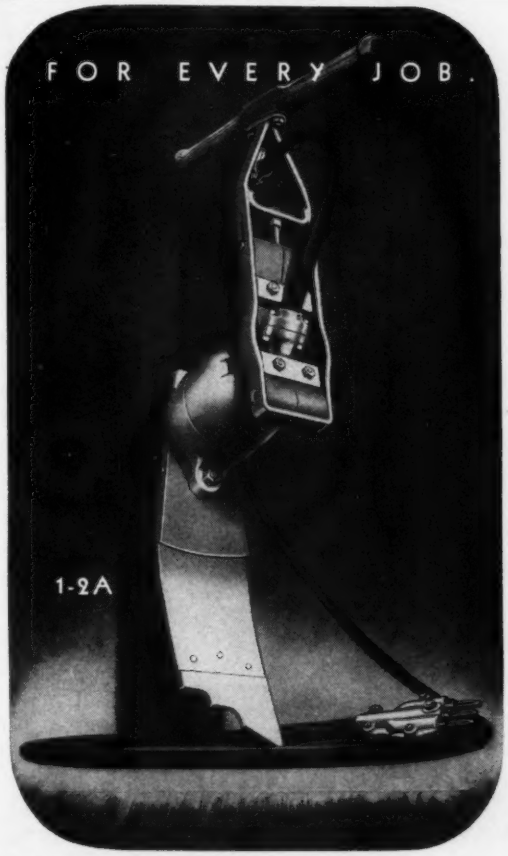
The Mansfield Type "B" is supreme in its field, the product of more than 50 years specialized experience. . . . Among its many outstanding features are: over-size waterways; range of delivery; liberal height for high tenders; sensitive valve control; non-stick drip valve not affected by treated water; non-leaking; one man operation with all operating parts easily accessible. And many more, all of a definite value. . . . The list of names using the Mansfield is a Blue Book of Railroads.

Complete Information On Request

U.S. ENGINE & PUMP CO.

Division of Batavia Metal Products, Inc.

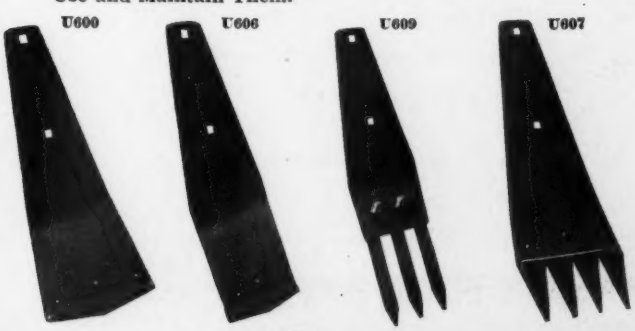
Batavia • Illinois



— A JACKSON MADE TAMPER BLADE

Organizer of ballast under ties . . . that's frankly what the JACKSON Universal Tie Tamper is. This method of **fitting** ballast together rather than crushing it, is only obtainable with a JACKSON tamper, equipped with one of several interchangeable tamping blades.

For every job in any lift and all ballasts, there is a JACKSON made Tamper blade. Each one performs its specific job with a maximum of uniformity and firmness and a minimum of labor. . . Write for booklet "JACKSON Tampers — How to Use and Maintain Them."



ELECTRIC TAMPER & EQUIPMENT CO.

LUDINGTON MICHIGAN

SEE WHAT A NEW CRANE OFFERS . . .

Get this catalogue

Every time - and effort-saving advantage that can be built into a locomotive crane is a feature of this modern, late - design AMERICAN LOCOMOTIVE CRANE. A 60-page catalog describes these advantages and illustrates, by actual installation photographs, the wide variety of material handling jobs for which this late-design locomotive crane is a natural.

Whether for furthering the war effort or for postwar planning, you should write for a copy.

Ask for catalog 600-L-1A

60 Years of Safety 1883 - 1943 The Genuine CROSBY CLIP

AMERICAN HOIST & DERRICK CO

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AMERICAN TERRY DERRICK CO. . . . South Kearny, N. J.

FASTEST METHOD OF CUTTING SHEET METALS

STANLEY UNISHEARS

No. 144A Unishear handling a tough cutting job in Railroad Repair Shop

Today's shortages of men and metal can be partially offset by time-saving, wide-utility Stanley Unishears. They cut any shape – straight, angle, or curves – with hairline accuracy. No waste or distortion of metal. Speed, as you feed, up to 15 feet per minute.

No. 144A Unishear has a capacity of 12 U. S. Gauge (7/64") hot rolled steel. Three other portable models are available and bench and stationary models to handle sheet metal up to 9/64" hot rolled steel.

Portable Unishears have universal motors and can be operated from any lighting circuit. In the field, they can be powered by portable gasoline units.

If you are not using Stanley Electric Tools for vital maintenance work, write us for complete information. Stanley Electric Tool Division, The Stanley Works, New Britain, Connecticut.

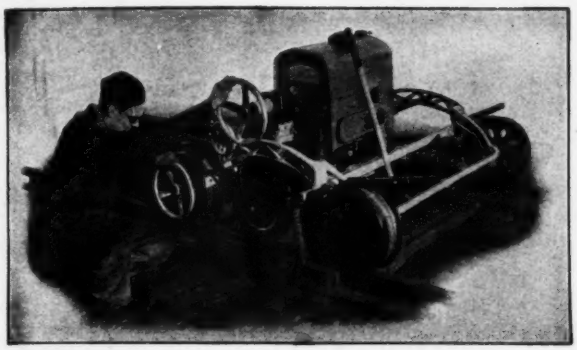
1843 STANLEY 1943

STANLEY UNISHEARS

THE ELECTRICALLY DRIVEN HAND SHEARS

TO MAINTAIN SERVICE MAINTAIN RAIL

You can't maintain war-time service indefinitely without keeping up peace-time rail maintenance standards or better. As rail maintenance equipment and manpower conserver, Railway Track-work Grinders are enlisted on leading railways throughout the Nation. Keep yours busy. For information on the many models available, write for latest data bulletins.



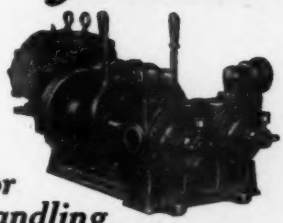
Railway Track-work Model P-6 Track Grinder—one of many models.

Railway Track-work Co.

3132-48 East Thompson St., Philadelphia

4785

the PUMP that is "Self-Adjusting for Wear"



for handling

DIESEL FUEL and FUEL OILS

BLACKMER ROTARIES

have been standard equipment for more than forty years.

POWER PUMPS

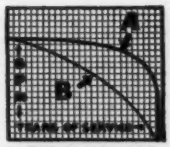
5 to 750 GPM. Pressures to 300 psi.
Single or multiple units.
All standard drives.

HAND PUMPS

7 to 25 GPM—54 Models.
Write for Bulletin 304—
FACTS ABOUT ROTARY PUMPS

Blackmer Pump Company

2140 Century Ave., Grand Rapids 9, Mich.



A—Blackmer pump capacity. Note the long sustained efficiency. B—Conventional Rotary Pump capacity.

Wear is confined to the tips of the buckets, which automatically compensate for wear.

This much can wear away, without affecting the capacity of the pump.

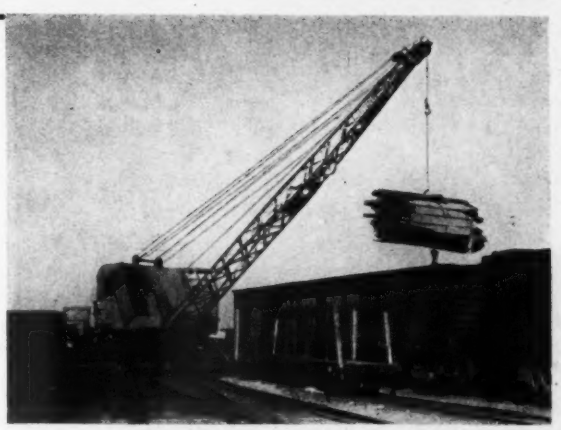
When worn out, replace the buckets and the pump is restored to normal efficiency.

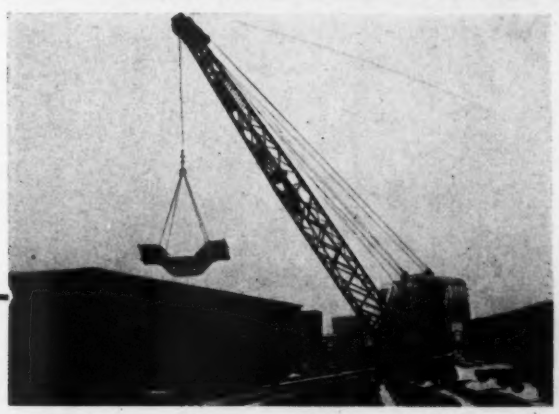
BLACKMER ROTARIES
POWER PUMPS · HAND PUMPS

When time is important

Burro Cranes get to the job *fast*—are built low enough to ride a flat car, can travel under their own power up to 22 m.p.h. They have a 7500 lb. draw bar pull, a 35 foot boom (standard) with elevated boom heels for close-in work, including a short tail swing, and many other special railway features, are the best all-around railway crane for track laying, construction and general maintenance work . . . are standard equipment on most lines.

Write for Bulletins F-100, F-110

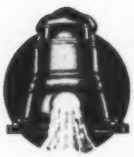




CULLEN-FRIESTEDT CO.,
1301 S. KILBOURN AVE. CHICAGO, ILLINOIS

VICTORY . . . AND LIBERTY

It's Time to Make Postwar Plans



Victory by our Armies means new liberty for Postwar activity. Manufacturers and municipalities then can, and will be expected to go ahead with plans of progress.

Those new plans will unquestionably include Wells and Pumps to supply an adequate amount of water—water that can be produced at exceptionally low cost. The Layne Organization has foreseen and made many plans for the days of Postwar. Highly improved designs—some of which were evolved to solve critical war needs, will be instantly available for factories and cities throughout the Nation.

Layne Well Water Systems have long enjoyed absolute superiority in highest efficiency. They have established and maintained thorough dependability. Their quality has been proven by nearly three quarters of a century of service. They are better built today than ever before.

For Postwar Water System planning, write for illustrated literature on Layne Pumps and Layne Well Water Systems. Address, Layne & Bowler, Inc. General Offices, Memphis 8, Tennessee.

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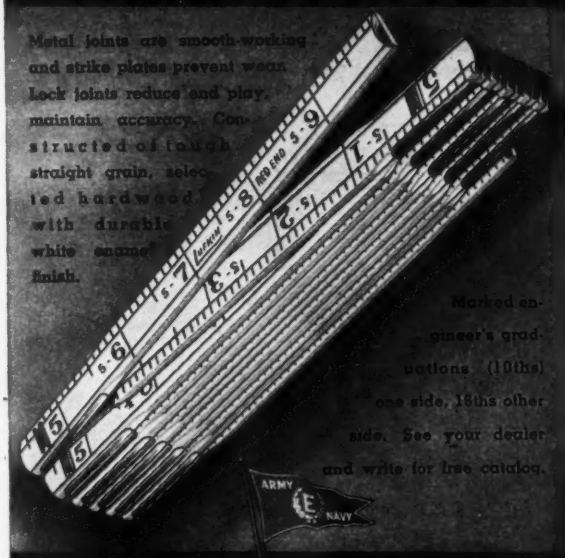
LAYNE

WELL WATER SYSTEMS

DEEP WELL PUMPS

Builders of Well Water Systems for Every Municipal and Industrial Need

LUFKIN 066—D ENGINEERS WOOD RULE FOR DURABILITY


Metal joints are smooth-working and strike plates prevent wear. Lock joints reduce end play, maintain accuracy. Constructed of tough, straight grain, selected hardwood with durable white enamel finish.
Marked engineer's graduations (10ths) one side, 16ths other side. See your dealer and write for free catalog.
ARMY
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LUFKIN

SAGINAW, MICHIGAN . NEW YORK CITY

TAPES . RULES . PRECISION TOOLS

Q and C CAR STOPS CONSERVE TRACK SPACE

Q and C Car Stops are applied with a minimum of labor, and wedge securely to the rails, no drilling being required.

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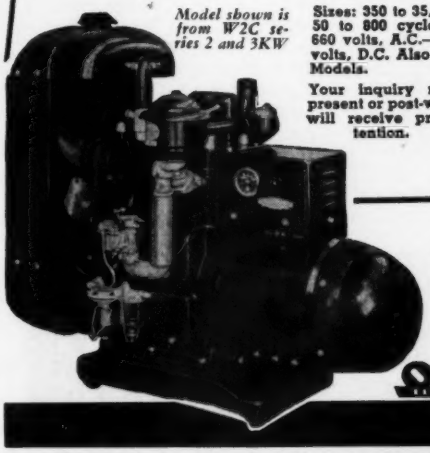

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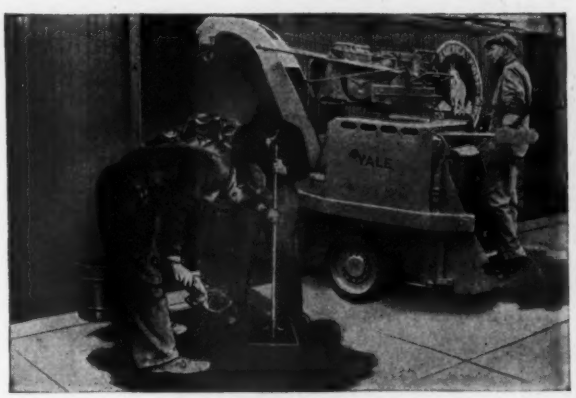

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